SOME LICHENS OF TROPICAL AFRICA

CARROLL WILLIAM DODGE

The following account is based largely upon two collections from Nigeria and Cameroons by C. A. Thorold; from Sierra Leone by F. C. Deighton and others, and from Uganda on orchid roots by H. A. Omastin (sent by Sir Edward Salisbury, Royal Botanic Gardens, Kew); one from Nyasaland by L. J. Brass (Vernay Expedition to Nyasaland) sent by the New York Botanical Garden; and a few from other sources.

Using Zahlbruckner's *Catalogus Lichenum Universalis* and other sources, in all the genera represented, I made keys to the species described from tropical Africa, here defined as the area between 15° N. and 15° S. latitudes and between 20° W. and 55° E. longitudes, but including all of Mozambique and Nyasaland in the east and Angola in the west. I also included the neighboring islands: the Cormoro Archipelago and Socotra, off the east coast, and Ascension, St. Helena, São Thomé, Annobon, Ilha Principe, and Fernando Po, off the west coast. Unfortunately, I have not had access to Stirton's papers in the *Transactions of the Glasgow Society of Field Naturalists*, which may have included some species from this area. I am including these keys at the appropriate places in hope that they may be useful to other lichenologists who may study material from this area. The countries and islands mentioned in the keys are those from which the species were described and do not indicate the geographic distribution of the species in question.

Perhaps the most interesting results are from Acharian species based on the collections of Afzelius in 1792-94 from Sierra Leone and Guinea. I have been unable to locate information regarding Afzelius' journey, but assume his "Guinea" was the Guinea Coast proper of geographers of that time, which included the modern Gold and Ivory Coasts although it may have included the whole coast from Senegal to Nigeria. The Nigerian and Cameroons collections are interesting as wholly collected on the bark of *Theobroma* (the foliicolous species having been sent to Santesson and published in his *Foliicolous Lichens I* (Symb. Bot. Upsal. 12:1:1–590. 1952). I know of no other such extensive collections from the bark of a single species of tree. In contrast to my experience with collecting on this substrate in Central America, *Leptogium* is represented by a few unidentifiable scraps, and the Pannariaceae are absent, both the most conspicuous groups in Central America. Below is a list of the species found on *Theobroma:*

PYRENULACEAE

Pyrenula eucalypta Vainio
Pyrenula fuscolurida Vainio
Pyrenula heteroclita Ach.
Pyrenula mamillana (Ach.) Trev.
Pyrenula trombetana Vainio
Anthracothecium nigeriensis Dodge

TRYPETHELIACEAE

Melanotheca cameroonensis Dodge
Melanotheca nigeriensis Dodge
Laurera nigeriensis Dodge

ASTEROTHELIACEAE

Pyrenastrum parathelioides Dodge

Issued December 18, 1953.

Cypheliaceae

Tylophoron ascidioides Vainio

Cryptothecieae

Cryptothecia nigeriensis Dodge
Cryptothecia Thoroldi Dodge

Opegraphaceae

Opegrapha nigeriensis Dodge
Opegrapha prosodea Ach.

Graphidaceae

Graphis nigeriensis Dodge
Graphis ondensis Dodge
Graphis Thoroldi Dodge
Phaeographis lynceodes (Nyl.) Zahlbr.
Phaeographis ochracea Dodge
Graphina ulcerata (Vainio) Zahlbr.
Phaeographina deducta (Nyl.) Zahlbr.

Chiodectonaceae

Sarcographa labyrinthica (Ach.) Müll. Arg.
Sarcographa Thoroldi Dodge

Thelotremaceae

Ocellularia cavata (Ach.) Müll. Arg.
Ocellularia scolecospora Dodge
Ocellularia trypanea (Ach.) Dodge
Thelotrema cameroonensis Dodge
Tremotylium africanum Räs.

Collemaceae

Collema nigrescens var. *minutum* Hue

Lecideaceae

Lecidea granifera (Ach.) Vainio
Lecidea nigeriensis Dodge
Lecidea rubina Ach.
Lecidea tenuis Müll. Arg.
Bacidia golungensis (Vainio) Zahlbr.
Bacidia nigeriensis Dodge

Phyllopsoraceae

Phyllopsora Buettneri (Müll. Arg.) Zahlbr.

Lecanoraceae

Lecanora aequinoctialis Stzbgr.

Blasteniaceae

Bombyliospora nigeriensis Dodge
Bombyliospora Thoroldi Dodge

Physciaceae

Physcia Poncinsii Hue

The usual techniques have been employed in this study, and colors have been recorded from Ridgway's *Color Standards and Color Nomenclature.* In some of the Graphidaceae with very thin thalli or where the thallus is endophloeodal, the color recorded may owe nearly as much to the color of the underlying bark as to the thallus, and other colors may be expected if the species is found on barks of other species. In the keys, the colors are those of the original descriptions or those recorded by other lichenologists based on the type specimen.

The data are still too few to warrant subdivision into floras. From the data at hand, it would seem that the East and West African floras are distinct, but little collecting has been done in the central portion of the continent. There is no apparent relation between the flora of North Africa from Morocco to Egypt and that of Sierra Leone. There is a less marked division between Sierra Leone and Liberia, although a few species apparently extend from Sierra Leone all the way to Angola. In the east there seems to be a division between Abyssinia, Somaliland and Socotra island and the area from Kenya southward.

Pyrenulaceae

Thallus crustose, uniform, epi- or endophloeodal; cortex often poorly developed or absent; algae *Trentepohlia;* perithecia solitary in thalline warts, rarely aggregated and somewhat concrescent, but not immersed in a stroma or pseudostroma (distinction from the Trypetheliaceae), erect with a central ostiole; spermatia usually exobasidial.

I have referred here three species of *Polyblastiopsis* and one of *Pseudopyrenula* with a single perithecium in a true stroma. The absence of a pseudostroma has been used to separate this family from the Trypetheliaceae, but it seems likely that when we know more of the development and interrelationships we will com-

bine these families and split on other combinations of characters as suggested by G. T. Johnson (Ann. Mo. Bot. Gard. 27:1–43. 1940). The phylogenetic significance of the stroma has also been questioned in the related Pyrenomycetes (Munk, Dansk Bot. Arkiv 15:2:1–163. 1953).

1. Paraphyses branched and anastomosing, persistent or evanescent....2
1. Paraphyses unbranched and free....6
2. Ascospores unicellular ....*Monoblastia* Riddle
2. Ascospores septate 3
2. Ascospores muriform ....*Polyblastiopsis* Zahlbr.
3. Spore protoplasts cylindric with thin septa....4
3. Spore protoplasts rounded to lenticular....*Pseudopyrenula* Müll. Arg.
4. Spermatia exobasidial or unknown 5
4. Spermatia endobasidial ....*Arthopyreniella* Steiner
5. Ascospores ellipsoid to fusiform....*Arthopyrenia* Mass.
5. Ascospores acicular, often helically twisted....*Leptorhapis* Koerb.
6. Ascospores unicellular ....*Coccotrema* Müll. Arg.
6. Ascospores septate 7
6. Ascospores muriform 11
7. Asci with 1–8 ascospores....8
7. Asci with many ascospores ....*Thelopsis* Nyl.
8. Spore protoplasts cylindric, septa thin 9
8. Spore protoplasts rounded to lenticular, brown....*Pyrenula* Ach.
9. Asci soon evanescent, ascospores acicular....*Belonia* Koerb.
9. Asci not soon evanescent 10
10. Ascospores hyaline ....*Porina* Müll. Arg.
10. Ascospores brown ....*Blastodesmia* Mass.
11. Ascospores hyaline, protoplasts appearing cubical....*Clathroporina* Müll. Arg.
11. Ascospores brown, protoplasts rounded to lenticular....*Anthracothecium* Hampe

THELOPSIS

THELOPSIS Nyl., Mém. Soc. I. Sci. Nat. Cherbourg 3:194. 1855.

Thelocarpon sect. *Thelopsis* Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges. 149. 1862.

Sychnogonia Körb., Syst. Lich. Germ. 332. 1855.

Holothelis Clements, Gen. Fung. 40. 1909.

Dithelopsis Clements, Gen. Fung. 40. 1909.

Type: *Thelopsis rubella* Nyl. *Sychnogonia,* published the same year, was based on *S. Bayrhoefferi* Zw., usually regarded as a synonym of *T. rubella. Holothelis* was based on *T. flaveola* Arn., as a segregate for the only species with unicellular spores, which may belong in *Thelocarpon* Nyl. *Dithelopsis* was based on *T. subporinella* Nyl. as a segregate with uniseptate spores. *Thelopsis inordinata* from India might equally well have been segregated as it was described with dwarf muriform spores.

Thallus thin, crustose, ecorticate, with *Trentepohlia* algae, often poorly developed. Perithecia sessile, naked or immersed in a thalline wart, wall relatively soft, light-colored to blackening with a central ostiole; paraphyses slender, free, unbranched (disappearing in *T. selenospora* Dodge); asci fusiform to oblong, the wall soon disappearing; ascospores usually long-ellipsoid, unicellular to 6-celled or dwarf-muriform, often surrounded with a thin halo.

Pyrenulaceae with polysporous asci have been assembled in this genus without much regard to other morphologic characters. *Thelocarpon* Nyl. and *Thelococcus*

Nyl. of the Acarosporaceae have the perithecia immersed in thalline warts with very little development of the perithecial wall, branched paraphyses and protococcoid algae. In other characters they seem more closely related to *Thelopsis* than to other members of the Acarosporaceae. *Thelopsis* has been reported mostly from temperate Europe and the Mediterranean basin, with one species in southern California and one in India.

THELOPSIS **selenospora** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Amphimas pterocarpoides*, F. C. Deighton M4334C.

Thallus hypophloeodes, filamentis *Trentepohliae* 5–6 μ diametro, cellulis 10–12 μ longis et hyphis tenuibus. Perithecia sphaerica, solitaria vel subaggregata, sessilia in disco thallino stramineo, aspera, 0.4–0.5 mm. diametro, dimidiata; parathecium 70 μ crassitudine, pseudoparenchymaticum, cellulis 6–8 μ diametro subcubicis, obscure brunneis sed non carbonaceis, ostiolo minuto umbilicato, cum cellulis algarum inter hypothecium et cellulas suberaceas corticis; hypothecium lenticulare, 25–30 μ crassitudine, hyphis dense contextum; paraphyses evanescentes; asci oblongi, apicibus non incrassati, polyspori, 65–70 $\times$ 14–16 μ; ascosporae fusiformes vel seleniformes, apicibus acutis, 6-loculares, septis tenuibus, 24 $\times$ 3 μ.

Thallus hypophloeodal except at the base of the perithecia, mostly between the cork layer and the underlying cells of the bark, consisting of *Trentepohlia* filaments and isolated cylindric cells, 10–12 $\times$ 5–6 μ, somewhat deformed by mutual pressure, and slender hyphae. Perithecia solitary to somewhat aggregated, each sessile on a thin disc of stramineous thallus, surface rough with a minute, inconspicuous ostiole about 0.4–0.5 mm. in diameter, dimidiate (appearing entire in thick sections since the walls of the cork cells at the base are darkened); wall about 70 μ thick, pseudoparenchymatous, cells 6–8 μ in diameter, appearing almost cubical, very dark brown but not brittle and carbonaceous, base with algal cells between the hypothecium and the cork cells of the bark; hypothecium lenticular, about 25–30 μ thick, of densely woven hyphae; paraphyses early disappearing; asci oblong, tip not thickened, polysporous, 65–70 $\times$ 14–16 μ; ascospores fusiform to more commonly crescent-shaped, helically twisted in the ascus as in *Bacidia* subg. *Scoliciosporum*, ends very acute, predominantly 6-locular, septa very thin, protoplasts nearly cylindric, surrounded by a thin halo, about 24 $\times$ 3 μ. Often one end of the ascospore is prolonged as a short filamentous appendage as in the ascospores of the Ashbyaceae.

Except for the polysporous asci and evanescent paraphyses, this species might easily be mistaken for a member of *Arthopyrenia* sect. *Pseudosagedia*. The much darker perithecial wall, evanescent paraphyses, and long-fusiform to crescent-shaped spores easily separate this species from other described species of *Thelopsis*.

POLYBLASTIOPSIS

POLYBLASTIOPSIS Zahlbr., in Engler & Prantl, Die nat. Pflanzenfam. I. 1*:67. 1903.
Polyblastia Müll. Arg., Flora 65:401. 1882, *non* Lönnr. 1858.
Mycoglaena Höhnel, Sitzungsber. K. Akad. Wiss. Wien, math. naturw. Kl. 118:1210. 1903.

Type: Thirteen species listed, none designated as type. *Mycoglaena* was based on *Verrucaria subcaerulescens* Nyl.

Thallus crustose, endo- or epiphloeodal; perithecia solitary, nude or more or less covered by the thallus, hemispheric or spherical, ostiole central; paraphyses branched and anastomosing; asci 1–8-spored; ascospores ellipsoidal to fusiform, muriform, septa thin, with or without a halo, hyaline.

Polyblastiopsis differs from *Clathroporina* only in the branched and anastomosing paraphyses instead of unbranched and free. It may also be confused with *Laurera* of the Trypetheliaceae when the perithecia are crowded. A monograph of the whole group is badly needed.

The systematic position of the species referred here is uncertain. While, in general, the perithecia occur singly, occasionally 2–3 are concrescent, often of quite unequal age, as if a new perithecium started to expand near the base of an older perithecium and the outer portions of the "walls" grew together. A strict morphologic interpretation of the perithecial wall would limit it to the inner carbonaceous wall, and the rest true stromatal tissue, especially since spermogonia occur in it. We have essentially monoperithecial stromata. Such an interpretation would place these species in *Laurera* in a special section, since the species previously described have several perithecia in each stroma. We have the same situation in *Pseudopyrenula Deightoni* Dodge in relation to *Bathelium*. On the other hand, most lichenologists, not being specialists in the Pyrenomycetes, would probably overlook the distinction and look for these species where I have placed them. It is hoped that comparative studies of the development of many more species in both the Pyrenulaceae and Trypetheliaceae, will eventually place our classification on a sounder basis.

1. Ascospores 4 per ascus, 190–220 × 30 μ; perithecium entire; Angola.....*P. fulva* (Vainio) Dodge
1. Ascospores 8 per ascus.....2
   2. Ascospores 20–34(–40) × 11–13 μ, 14–16-locular, 6-locellate; perithecium entire, occurring singly in a thick stroma; Sierra Leone .....*P. pyriformis* Dodge
   2. Ascospores 25–28 × 10 μ, 6–8-locular, 2–4-locellate; perithecium dimidiate; Socotra .....*P. tropica* (Müll. Agr.) Zahlbr.
   2. Ascospores more than 75 μ long; perithecium entire.....3
3. Ascospores (75–)80(–85) × 14–16 μ, 14-locular, 2–3-locellate; perithecium thin, occurring singly in a thick stroma; Sierra Leone.....*P. linearis* Dodge
3. Ascospores (80–)100–120(–126) × 18–26 μ, 32–36-locular, plurilocellate, perithecium 120–140 μ thick on the sides, 20–30 μ thick at the base; Congo.....*P. haematochroa* Hue
3. Ascospores 133–160 × 27 μ, 24-locular, 8-locellate; perithecium 50–55 μ thick, occurring singly in a spherical stroma; Sierra Leone.....*P. sphaerica* Dodge

POLYBLASTIOPSIS **fulva** Dodge, comb. nov.

Thelenella (Euthelenella sect. *Microglaena) fulva* Vainio, Cat. Welwitsch Afric. Pl. 2:451. 1901.

Clathroporina fulva Zahlbr., Cat. Lich. Univ. 1:418. 1922.

Type: Angola, Golungo Alto, near Mata Quisuculo, on wild *Citrus medica*, Welwitsch 230.

Zahlbruckner was in error in transferring this species to *Clathroporina*, as Vainio clearly states that the paraphyses are branched and anastomosing, the main character differentiating *Polyblastiopsis* from *Clathroporina*.

Polyblastiopsis **pyriformis** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on trunk of *Anisophyllea laurina*, F. C. Deighton M4404.

Thallus epiphloeodes, olivaceus, nigro-marginatus, 160 μ crassitudine; cortex 55 μ crassitudine, gelifactus, hyphis tenuibus periclinalibus; stratum algarum 80 μ crassitudine filamentis *Trentepohliae* verticalibus, densis, 6–8 μ diametro, cellulis subrotundatis; medulla 25 μ crassitudine, hyphis tenuissimis. Stromata sessilia, subpyriformia, 0.5 mm. diametro, 0.6 mm. altitudine, basi constricta; cortex stromaticus 15 μ crassitudine, hyphis periclinalibus brunneis, stratum interius pseudoparenchymaticum, 30 μ crassitudine; parathecium carbonaceum, integrum, 30 μ crassitudine; hypothecium lenticulare, centro 40 μ crassitudine; paraphyses tenues, dichotome ramosae anastomosantesque; asci cylindrici, dein subfusiformes, 135 $\times$ 25 μ; ascosporae imbricatim monostichae dein subdistichae, fusiformes, murales, hyalinae, 14–16-loculares, 6-locellatae, 30–34(–40) $\times$ 11–13 μ. Spermatia bacillares, 5–6 $\times$ 1.5 μ.

Thallus epiphloeodal, about 160 μ thick, dark olive buff with a narrow black margin; cortex 55 μ thick, gelified from slender periclinal hyphae; algal layer 80 μ thick, of vertical, closely packed filaments of *Trentepohlia* 6–8 μ in diameter, cells somewhat rounded; medulla about 25 μ thick, of very slender, densely woven hyphae, extending some distance farther into the bark cells. Stromata sessile, subpyriform, about 0.5 mm. in diameter, 0.6 mm. tall, constricted at the base; cortex 15 μ thick, brownish, of relatively large periclinal hyphae, interior pseudoparenchymatous, about 30 μ thick; parathecium carbonaceous, entire, 30 μ thick; hypothecium lenticular, about 40 μ thick in the center; paraphyses slender, dichotomously branched and anastomosing in the nuclear gel; asci cylindric at first, becoming subfusiform with a rounded tip, about 135 $\times$ 25 μ; ascospores imbricately monostichous, becoming subdistichous, fusiform, muriform, hyaline, about 14–16-locular, 6-locellate, protoplasts very slightly rounded, 30–34(–40) $\times$ 11–13 μ.

Spermogonia too old for satisfactory description, arising in the base of the young stroma near the perithecial initial, becoming distorted and flattened against the stromatal cortex as the perithecium expands; wall hyaline or nearly so; spermatiophores not clearly seen; spermatia bacilliform, 5–6 $\times$ 1.5 μ.

Sierra Leone: Njala (Kori), on *Anisophyllea laurina*, F. C. Deighton M4404, type; on *Dialium guineense*, F. C. Deighton M4794.

Polyblastiopsis **linearis** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on *Citrus aurantifolius*, F. C. Deighton M4634.

Thallus epiphloeodes, olivaceus, subverrucosus, non nigro-marginatus, 200 μ crassitudine; cortex 40 μ crassitudine, gelifactus; stratum algarum 90–100 μ crassitudine filamentis *Trentepohliae* verticalibus 8 μ diametro, cellulis ad 16 μ longitudine; medulla 65 μ crassitudine, hyphis tenuibus. Stromata linealiter disposita sed rare concrescentia, sessilia, nuda, subsphaerica, basi constricta, nigra, 1.25–

1,3 mm. diametro; cortex stromaticus 15 μ crassitudine, hyphis pachydermeis intertextis, obscure brunneis; stratum interior 90–100 μ crassitudine, pseudoparenchymatica ex hyphis periclinalibus 5 μ diametro; parathecium 20–25 μ crassitudine, integrum, carbonaceum; nucleus sphaericus vel subpyriformis, circa 1000 μ diametro; hypothecium 30 μ crassitudine; paraphyses tenues ramosae anastomosantesque; asci cylindrici, pachydermei (ad 18 μ crassitudine), dein leptodermei (3–4 μ), stipes ad 130 μ longitudine, tenuis, venter 510 $\times$ 40 μ; ascosporae octonae, imbricatim distichae, hyalinae, murales, fusiformes, 14-loculares, 2–3-locellati, (75–) 80 (–85) $\times$ 14–16 μ, tenui cum halone juventute indutae.

Thallus epiphloeodal, citrine drab to deep olive, somewhat verrucose, not black-margined, about 200 μ thick; cortex 40 μ thick, gelified from subvertical hyphae; algal layer 90–100 μ thick, of vertical filaments of *Trentepohlia* 8 μ in diameter, cells about 16 μ long, the upper surface of the layer quite uneven; medulla 65 μ thick, of densely woven slender hyphae with occasional bark cells; some of the algal filaments penetrating into the bark and forming 2–3 thin layers of thallus between the layers of bark cells. Stromata often closely aggregated in lines but rarely concrescent, sessile, subspherical, nude, very constricted at the base, black, 1.25–1.3 mm. in diameter; stromatal cortex 15 μ thick, of dark brown, thick-walled interwoven hyphae with lacunae (probably from old spermogonia); interior 90–100 μ thick, of brown, relatively thin-walled pseudoparenchyma from periclinal hyphae about 5 μ in diameter; parathecium 20–25 μ thick, entire, carbonaceous; nucleus spherical to subpyriform, about 1000 μ in diameter; hypothecium about 30 μ thick, covering the base of the parathecium; paraphyses slender, branching and anastomosing; asci cylindric and very thick-walled (18 μ) when young, becoming more fusiform and thin-walled (3–4 μ) at maturity, 8-spored, stipe about 130 μ long, slender, venter about 510 $\times$ 40 μ; ascospores imbricately subdistichous, hyaline, muriform, fusiform, about 14-locular, 2–3-locellate, with a thin halo when young, (75–) 80 (–85) $\times$ 14–16 μ.

POLYBLASTIOPSIS **sphaerica** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Orthocosmus africanus*, F. C. Deighton M4795.

Thallus epiphloeodes, ochraceo-olivaceus, margine tenui, nigro, 100–110 μ crassitudine; cortex 40 μ crassitudine, gelifactus hyphis periclinalibus; stratum algarum 25–30 μ crassitudine, filamentis verticalibus *Trentepohliae*, 10–11 μ diametro; medulla 40–45 μ crassitudine, hyphis tenuibus dense contexta. Stromata 1–1.5 mm. diametro, subsphaerica, sessilia, basi constricta, ostiolo subumbilicato; cortex 30 μ crassitudine, hyphis periclinalibus obscure brunneis; stratum interius 90–95 μ crassitudine, pseudoparenchymaticum obscure brunneum; parathecium 50–55 μ crassitudine, integrum, carbonaceum; nucleus subpyriformis, gelifactus; hypothecium 40 μ crassitudine hyphis tenuibus dense contextum; paraphyses tenues, ramosae anastomosantesque; asci pachydermei, cylindrici juventute, dein clavati, leptodermei, stipite tenui, 50 μ longitudine, venter 300 $\times$ 50–55 μ; ascosporae octonae, subdistichae, hyalinae, murales, 24-loculares, 8-locellatae, halone tenui indutae, 133–160 $\times$ 27 μ.

Thallus epiphloeodal, between olive ochre and ecru-olive, with a very narrow black margin, 100–110 μ thick; cortex about 40 μ thick, gelified from predominantly periclinal hyphae; algal layer about 25–30 μ thick, of vertical filaments of *Trentepohlia* 10–11 μ in diameter, upper surface very uneven; medulla 40–45 μ thick, of densely woven slender hyphae, including many disorganized bark cells. Stromata 1–1.5 mm. in diameter, subspherical, sessile, constricted at the base, with a slight depression about the ostiole; cortex about 30 μ thick, of periclinal dark brown hyphae; interior 90–95 μ thick, of dark brown thin-walled pseudoparenchyma (black in thick sections with lacunae probably from old spermogonia); parathecium 50–55 μ thick, entire, carbonaceous; nucleus highly gelified, subpyriform; hypothecium 40 μ thick, of slender, densely woven hyphae covering the base of the parathecium; paraphyses slender, branched and anastomosing; asci 8-spored, very thick-walled and cylindric at first, becoming thin-walled and clavate as the spores mature, stipe slender, about 50 μ long, venter about 300 $\times$ 50–55 μ; ascospores subdistichous, hyaline, muriform, about 24-locular, 8-locellate, with a thin halo, 133–160 $\times$ 27 μ.

Deighton M4649 has smaller ascospores (93–) 133 (–146) $\times$ (19–) 21 μ and a grayer thallus, i.e. citrine-drab to deep olive, but is otherwise similar in structure.

Sierra Leone: Njala (Kori), on bark of *Orthocosmus africanus*, F. C. Deighton M4795, type; on bark of *Dialium Dinklagii*, F. C. Deighton M4649.

PSEUDOPYRENULA

PSEUDOPYRENULA Müll. Arg., Flora 66:247. 1883.

Type: none designated, 17 species listed. *Pyrenula pupula* Ach. should be chosen as the type, since it belongs in the section with the largr number of species.

Thallus crustose, epi- or endophloeodal with *Trentepohlia* algae. Perithecia entire or dimidiate, wall carbonaceous, nude or partly covered by the thallus; paraphyses branched and sometimes anastomosing; asci 8-spored; ascospores hyaline, transversely septate, protoplasts rounded, not cylindric.

This genus is analogous to *Pyrenula*, being segregated for its hyaline spores. It differs from *Porina* Müll. Arg. in its branched paraphyses and the rounded or lenticular protoplasts of its ascospores. In a few species, the perithecia tend to be aggregated but not assembled in a definite pseudostroma as in *Bathelium* and *Trypethelium*. It is widely distributed in the tropics but less common than *Pyrenula* in most floras.

1. Perithecium entire 2
1. Perithecium dimidiate, ascospores 4-locular 4
   2. Ascospores 4-locular 3
   2. Ascospores 6–8-locular, 16–22 $\times$ 6–7 μ; perithecial warts hemispheric, black, 0.3–0.35 mm. in diameter; Mozambique ..... *P. polyphragmia* Vainio
3. Ascospores 22–27 $\times$ 7–9 μ; perithecial wart 0.5 mm. in diameter; São Thome ..... *P. infossa* (Nyl.) Zahlbr.
3. Ascospores 18–21 $\times$ 6–8 μ; peritheca very thin-walled, solitary in a brown stroma, ostiole surrounded by a white disc; Sierra Leone ..... *P. Deightoni* Dodge
   4. Ascospores 16–20 $\times$ 4–6 μ; thallus whitish; Angola ..... *P. bengoana* Vainio
   4. Ascospores 23–24 $\times$ 5.5–6 μ; thallus olivaceous; Angola ..... *P. conica* Müll. Arg.

SECT. HOMALOTHECIUM

PSEUDOPYRENULA sect. HOMALOTHECIUM Müll. Arg., Bot. Jahrb. [Engler] 6:408. 9 June, 1885.

Pseudopyrenula sect. *Holothecium* Müll. Arg., Flora 68:331. 11 June 1885.

Section *Homalothecium* was formally described, limiting the group to species with immersed, entire perithecia, listing *Pyrenula annularis* Fée, *P. neglecta* Müll. Arg., *P. discolor* and *P. discolorella*. Section *Holothecium* was proposed without formal description, treating *P. annularis* Fée, *P. porinoides* Müll. Arg., *P. Pupula* Ach., and *P. neglecta* Müll. Arg., evidently intended for species with entire perithecia. In 1888 (Mém. Soc. Phys. Hist. Nat. Genève 30:3:28–29), Müller Argau did not use section names, although he treated two species under the heading "Perithecium completum," *P. Pupula* (about one-third emersed) and *P. ceratina* (Fée) Müll. Arg. (more innate). Zahlbruckner (in Engler, and Die nat. Pflanzenfam. 8:78. 1926) limits the section with 4-celled spores, listing *P. Pupula* (Ach.) Müll. Arg. and *P. annularis* (Fée) Müll. Arg.

PSEUDOPYRENULA **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Peltophorum africanum* var. *speciosum*, F. C. Deighton M4340.

Thallus epiphloeodes, isabellinus vel brunneo-olivaceus, margine nigro; cortex 55 μ crassitudine, decompositus; stratum algarum 30–60 μ crassitudine, filamentis verticalibus *Trentepohliae*, 5–6 μ diametro, cellulis 8 μ longitudine; medulla 80–160 μ crassitudine, hyphis tenuibus dense contexta. Stromata 0.5 mm. diametro, 0.3 mm. altitudine, sessilia, nuda, nigra, ostiolo albo-marginato, 70–80 μ crassitudine, pseudoparenchymatica, brunnea, cellulis 5–6 μ diametro; parathecium 5–6 μ crassitudine, integrum, carbonaceum; hypothecium 10 μ crassitudine, hyalinum, hyphis tenuibus pachydermeis dense contextum; paraphyses 130–150 μ altitudine, dichotome ramosae; asci cylindrici, apice non incrassati, 100 $\times$ 14 μ; ascosporae octonae, imbricatim distichae, ellipsoideae, 4-loculares, protoplastis rotundatis, 5–6 μ diametro, juventute cum halone, 18–21 $\times$ 6–8 μ.

Thallus epiphloeodal, isabelline to light brownish olive or darker, with a conspicuous black margin; cortex about 55 μ thick, decomposed; algal layer 30–60 μ thick, of vertical filaments of *Trentepohlia* 5–6 μ in diameter, cells about 8 μ long; medulla 80–160 μ thick, of slender, densely woven hyphae containing disintegrating bark cells and an occasional algal cell. Stromata about 0.5 mm. in diameter and 0.3 mm. tall, each containing a single perithecium, sessile, nude, black except for the whitish disc about the ostiole; wall about 70 μ thick on top and sides of the perithecium, 80 μ thick below it, of brown, coarse hyphae forming a pseudoparenchyma with isodiametric cells 5–6 μ in diameter; parathecium very thin, 5–6 μ, black, carbonaceous, entire; hypothecium about 10 μ thick, hyaline, of densely woven, thick-walled hyphae; paraphyses 130–150 μ tall, sparingly dichotomously branched, imbedded in the nuclear gel; asci cylindric, 8-spored, about

100 × 14 μ, tip not thickened; ascospores imbricately distichous, ellipsoidal, 4-locular, protoplasts spherical, 5–6 μ in diameter, with a conspicuous halo 3 μ thick when young, 18–21 × 6–8 μ.

This species is related to *P. infossa* (Nyl.) Zahlbr. from São Thomé, from which it is distinguished by the white disc about the ostiole, the more emergent and smaller "perithecia," and smaller spores. The systematic position of this species is uncertain. I have placed it in *Pseudopyrenula* because of the hyaline spores and the perithecia solitary in the stroma, but a strictly morphologic interpretation would place it in *Bathelium*, which usually has several perithecia per stroma. The distinction between the parathecium and stromatal tissue is clear only in very thin sections. It is analogous to the species which I have placed in *Polyblastiopsis* in their relation to *Laurera*.

Sierra Leone: Njala (Kori), on bark of *Peltophorum africanum* var. *speciosum*, F. C. Deighton M4340, type; on *Citrus aurantifolius*, F. C. Deighton M4627.

Sect. Hemithecium

Pseudopyrenula sect. Hemithecium Müll. Arg., Bot. Jahrb. [Engler] 6:407. 1885.

Type: not designated; *P. flavicans* Müll. Arg., *P. diremta* (Nyl.) Müll. Arg., *P. diluta* (Nyl.) Müll. Arg., *P. subgregaria* Müll. Arg., *P. superans* Müll. Arg., and *P. elliptica* were listed.

Perithecia dimidiate or base very thin, sessile or slightly immersed at the base, nude, conico-hemispheric; spores 4-locular.

Pseudopyrenula bengoana Vainio, Cat. Welwitsch Afric. Pl. 2:457. 1901.

Type: Angola, Bengo near Quifandongo, on twigs, *Welwitsch 437*.

Thallus epiphloeodal, thin, whitish, smooth, surface dull, without a distinct hypothallus or partly with a black margin, K—. Perithecia solitary, hemispheric, 0.2–0.25 mm. in diameter, nude, black or with a slight thalline covering at the base, ostiole slightly impressed; wall dimidiate, fuliginous; paraphyses branched and anastomosing; asci 8-spored, subcylindric, 40 × 12 μ; ascospores distichous, oblong, hyaline, 4-locular, protoplasts lenticular, equal, 16–20 × 4–6 μ.

Our specimen has a deep olive-buff thallus with a complete and conspicuous black margin; the asci are about 50–55 × 10–12 μ, ascospores 20–22 × 5–6 μ with spherical protoplasts 5 μ in diameter. In other characters it agrees well with Vainio's description translated above. Since I have not seen the type, I have preferred to refer my material to Vainio's species rather than describe it as new.

Sierra Leone: Njala (Kori), on *Peltophorum africanum* var. *speciosum*, F. C. Deighton M4341, M4343.

PYRENULA

Pyrenula Ach., Lichenogr. Univ. 64–66, 314–318, 676. 1810, *pro parte minore*; Mass., Ricerche Autonom. Lich. Crost. 162. 1852.

Bunodea Mass., Symmicta, 74. 1855.

Type: The selection of the type is very difficult. Of the nine species treated

by Acharius in 1810, seven have been transferred elsewhere and the two remaining species, *P. ocellata* and *P. subaperta*, have not been studied microscopically, hence their systematic position is uncertain. Massalongo, in 1852, was the first to use microscopic characters in the modern sense, and in 1855 he designated *P. Alni* Mass. as the type and *P. nitida* (Weig.) Ach. (1814) as the type of his segregate *Bunodea*. Koerber (Syst. Lich. Germ. 359. 1855) suggested that *P. nitida* differed from the other species which he included in the genus and might be taken as the type of a new genus, although he did not propose one. He abandoned the idea later, reducing *Bunodea* to synonymy in his *Parerga Lichenologica* 333–334. 1863. Either species would conserve the generic name in its present sense.

Thallus crustose, epi- or endophloeodal, ecorticate, with *Trentepohlia* algae; perithecia solitary or aggregate, nude or immersed in the thallus; wall black, entire or dimidiate; paraphyses simple, free; asci 8-spored; ascospores usually 4-locular (2-locular in sect. *Pseudacrocordia* and 6–10-locular in sect. *Fusidiospora*), brown, with lenticular, round or polyhedral protoplasts.

This genus differs from *Pseudopyrenula* in its brown ascospores, and from *Melanotheca* by the absence of a clearly developed pseudostroma, in which the perithecia are imbedded. The genus is widely distributed in tropical regions with a few species in the temperate zone.

1. Perithecia entire, wholly immersed at maturity except for the ostiolar disc or papilla....2
1. Perithecia emergent to nearly sessile at maturity....5
2. Perithecia flat above, forming a black disc about the ostiole below the level of the greenish thallus, the lower half of the perithecium sunken in the bark; spore size unknown; Sierra Leone ....*P. ocellata* Ach.
2. Perithecia hemispheric, disc black; thallus greenish ashy becoming cinnabar red; spores 20 × 8 μ; Kenya....*P. Gravenreuthii* Stein
2. Perithecia rounded above, often with an ostiolar papilla; spores mostly more than 20 μ long 3
2. Perithecium spherical; ascospores 23 × 10–12 μ, 4-locular; Socotra....*P. obscurata* Müll. Arg.
3. Base of perithecium thinner than the sides, perithecia 0.7–0.8 mm. in diameter; spores 22–34 × 11–15 μ; thallus pale tawny; Angola....*P. gibberosa* Vainio
3. Base of perithecium as thick as the sides....4
4. Spores 25–34 × 10–14 μ; thallus olive; Kenya....*P. mastophorizans* Müll. Arg.
4. Spores (17–)23–24(–29) × 10–13 μ; thallus stramineous; Mozambique....*P. mozambica* Vainio
4. Spores 17–24 × 9–10 μ; thallus pale olive; perithecia 0.15–0.3 mm. in diameter; Angola ....*P. Euphorbiae* Vainio
5. Spores more than 25 μ long; thallus pale....6
5. Spores less than 20 μ long....8
6. Base of perithecium as thick as sides, perithecium subspherical, 0.7–1 mm. in diameter; ascospores 36–42 × 16–18 μ; Angola....*P. Acaciae* Vainio
6. Base of perithecium thinner than sides; apical protoplasts of ascospores smaller than the middle ones 7
7. Perithecial warts 0.5–0.6 mm.; perithecium oblate-spheroid but not winged at the base; ascospores (25–)36 × (11–)15 μ; Angola ....*P. trombetana* Vainio
7. Perithecial warts 0.5–0.7 mm.; perithecium oblate-spheroid, winged at the base; ascospores 30–37 × 14–16 μ; Angola....*P. eucalypta* Vainio
7. Perithecial warts 0.7–0.8 mm.; perithecium spherical; ascospores 30–38 × 12–15 μ; Angola ....*P. oculifera* Vainio
8. Perithecium dimidiate 9
8. Perithecium entire 10
9. Perithecia 0.2–0.25 mm.; ascospores 14–16 × 5–6 μ; thallus white; Sierra Leone.....*P. parva* Vainio
9. Perithecia 0.5–0.8 mm.; ascospores 14–17 × 6–7 μ; thallus fuscous; Sierra Leone.....*P. fuscolurida* Vainio

10. Thallus white or pale ashy; perithecia conic-hemispheric; apical cells of ascospores smaller than middle cells 11
10. Thallus ashy olive; perithecia 0.15–2 mm., flattened-conic, base thinner, winged; ascospores 15–16 × 4.5–5 μ; apical cells not smaller; Guinea..... *P. heteroclita* Ach.
10. Thallus green or yellow-green 12
10. Thallus drab to hair brown; perithecia conic, base winged, 0.6–0.7 mm.; nucleus conic; ostiole umbilicate; ascospores 13–14 × 8 μ, apical cells not conspicuously smaller; Nigeria ..... *Melanotheca nigeriensis* Dodge
11. Perithecia 0.5 mm., with flat base, not winged; ascospores 11–16 × 7–9 μ; thallus whitish, partly black-margined; São Thomé..... *P. glabriuscula* (Nyl.) Vainio
11. Perithecia 0.6–0.8 mm., nucleus spherical; ascospores 13–14 × 5–6 μ; thallus pale ashy; Mozambique ..... *P. Limae* Vainio
12. Perithecia 0.5–0.6 mm., hemispheric with flat base as thick as the sides; ascospores 14–16 × 8–11 μ, apical cells smaller; thallus yellowish-greenish; Sierra Leone ..... *P. aspistea* Afz. in Ach.
12. Perithecia 0.6–0.7 mm., flattened-conic with papilla; ascospores 17–21 × 7–8 μ, apical cells not smaller; thallus green; Sierra Leone..... *P. mamillana* (Ach.) Trev.

PYRENULA TROMBETANA Vainio, Cat. Welwitsch Afric. Pl. 2:454. 1901.

Type: Angola, Golungo Alto, near Trombeta, 330–660 m., on bark of Leguminosae, *Welwitsch 124*.

Thallus epiphloeodal, pale olive buff with a paler inconspicuous margin, about 125 μ thick; cortex 100 μ thick, of very slender, periclinal, conglutinate hyphae, the outer 25 μ somewhat decomposed and granular; algal layer up to 25 μ thick, lying on the outermost bark cells, somewhat discontinuous, of *Trentepohlia* filaments about 6 μ in diameter; medulla not differentiated but fungus hyphae penetrate between the cork cells and disorganize them. Perithecia 0.6–0.8 mm. in diameter, spherical, nearly innate in the bark until the spores mature, then emersed about one half and appearing hemispheric; wall 55 μ thick at the ostiole, expanding to 80 μ at the base, then thinning to about 25 μ under the thecium, carbonaceous, covered with a layer of thalline cortex about 15 μ thick; ostiole somewhat excentric (but not as much so as in *Parathelium*), somewhat umbilicate and paler in old perithecia before the upper half cracks away, first exposing the nuclear remains, then leaving a cupuliform depression; hypothecium scarcely developed; paraphyses slender, dichotomously branched in the thecial gel; asci cylindric, thin-walled, about 135 × 20 μ, the wall disappearing before the ascospores mature; ascospores monostichous, broadly ellipsoidal, fuscous, 4-locular, apical protoplasts hemispheric, about 5 μ in diameter, central spherical to somewhat angled, 8–9 μ in diameter, the whole ascospore 27–32 × 14–16 μ.

The above description is based on our material. Vainio reports the thallus wholly endophloeodal, the perithecia only 0.5–0.6 mm. in diameter, the ascospores distichous and slightly larger (25–) 36 × (11–) 15 μ, with the apical protoplasts only a little smaller. The thalline characters of *P. oculifera* Vainio from Angola are closer to our material but the thallus is abruptly thinned leaving an area 0.3–0.4 mm. about the ostiole and the ascospores are somewhat longer and narrower.

Nigeria: Ondo Province, Owena near Akure, on *Theobroma*, C. A. Thorold 171.

PYRENULA EUCALYPTA Vainio, Cat. Welwitsch Afric. Pl. 2:453. 1901.

Type: Angola, Golungo Alto, near Luinha, on *Ficus Quebeba* Welw., Welwitsch 213 *p.p.*

Thallus epiphloeodal, relatively thick, about 250 μ, pale olive buff; cortex 65 μ thick, gelified, of densely woven, predominantly periclinal, very slender hyphae; algal layer about 30 μ thick, cells short-cylindric, 5–6 μ in diameter, mostly not united in filaments, *Trentepohlia;* medulla about 155 μ thick, of densely woven hyphae, containing occasional disintegrating bark cells and algal cells. Perithecia solitary, immersed in the thallus at first, becoming hemispheric, the lower half covered by thallus and the upper portion by a thin layer of cortex thinning to 10 μ about the ostiole through which the black perithecium shows, and lining the ostiolar depression (about 40 μ thick) which is about 180 μ in diameter, thus appearing white and conspicuous; parathecium about 230 μ thick in the middle of the sides, tapering toward the ostiole and toward the base, not produced into a wing at the base in our material, base thinner, about 125 μ thick, somewhat flattened (but not as flat as in *P. mamillana*), carbonaceous and brittle; hypothecium scarcely developed; paraphyses slender, dichotomously branched, without conspicuous oil droplets in the thecial gel; asci cylindric, 8-spored; ascospores fuscous, 4-locular, ellipsoid, protoplasts square in optical section, the sides of the middle two about 6–8 μ, of the apical ones 5–6 μ, the whole ascospore 30–37 $\times$ 14–16 μ.

Cameroons: Kumba, on *Theobroma,* C. A. Thorold 102.

PYRENULA FUSCOLURIDA Vainio, Cat. Welwitsch Afric. Pl. 2:453. 1901.

Type: Sierra Leone, near Freetown, on *Spondias Mombin* L., Welwitsch 247 *p.p.*

Thallus endophloeodal, indicated by a fuscous or testaceo-fuscous area surrounded by a black line; perithecia solitary or rarely 2–3-confluent, flattened-hemispheric and only slightly emergent until the ascospores mature then becoming hemispheric and empty as the nucleus disintegrates, 0.5 mm. or more in diameter, dimidiate, base angled but not winged; ostiole minute, not surrounded by a papilla; parathecium about 100 μ thick at the base, tapering to about 40 μ thick about the ostiole, carbonaceous, brittle; hypothecium very thin so that the asci and paraphyses appear to arise directly from the somewhat darker bark cells; paraphyses branched, apparently somewhat anastomosed above the asci; asci 8-spored, narrowly cylindric; ascospores obliquely monostichous, 4-locular, protoplasts of about equal size, rounded, fuscous, 14–17 $\times$ 6–7 μ.

Our Nigerian material is very old and the spores are shrunken so that no measurements could be obtained. Our material from Sierra Leone is very young and shows an epiphloeodal citrine thallus 80 μ thick, cortex 25–50 μ thick, of decomposed periclinal hyphae; algal layer 50–75 μ thick, somewhat discontinuous, of more or less disorganized *Trentepohlia* filaments; medulla not differentiated, but fungus hyphae extend between the bark cells and disorganize them. Young perithecia show a thin black wall about 25 μ thick, of very slender periclinal hyphae,

surrounded by a brown pseudoparenchymatous layer 50–70 μ thick, then an algal layer about 50 μ thick, and a cortex 40 μ thick of brownish more slender hyphae with granules. As the perithecium matures, the algae die and disintegrate and the whole darkens into the thick parathecium. Mature ascospores agree in size with those described by Vainio.

Sierra Leone, Njala (Kori), on *Cassia siamea*, F. C. Deighton M4793.

Nigeria: Ondo Province, Aponmu near Akure, on *Theobroma*, C. A. Thorold 172a.

PYRENULA HETEROCLITA Ach., Syn. Lich. 127. 1814.

Type: Guinea, corticole, Afzelius.

Thallus epiphloeodal, about 60 μ thick, ashy olive; cortex 30 μ thick, of slender, conglutinate periclinal hyphae, the outer 10 μ decomposed and granular; algal layer about 30 μ thick with some of the *Trentepohlia* filaments penetrating the bark cells beneath; medulla not differentiated. Perithecia 150–250 μ in diameter, about 150 μ tall, lenticular in opical section, about half emersed at maturity, nude or with remnants of the decomposed cortex, about 5–8 μ thick; parathecium about 50 μ thick above, winged at the base another 50 μ, thinning under the thecium to 25 μ, carbonaceous; hypothecium 10 μ thick, of very slender, densely woven hyphae; paraphyses slender, dichotomous; asci evanescent; ascospores 4-locular, fusiform to ellipsoid, fuscous, apical protoplasts subconic, only slightly smaller than the subspheric central ones, 15–16 $\times$ 4.5–5.5 μ.

The Sierra Leone material has very old perithecia with the thecia disintegrated and only a few shrunken brown ascospores were seen, but such characters as were observable would place it here. The Cameroons material is very scant, only a portion of a thallus growing on *Theobroma* with *P. mamillana* (Ach.) Trev., *Sarcographa labyrinthica* (Ach.) Müll. Arg., and *Phaeographis lynceodes* (Nyl.) Zahlbr. After a study of the type, Müller Argau concluded that the two varieties were growth stages, v. *minuscula* Ach. being the juvenile stage of the mature v. *denigrata* Ach.

Sierra Leone: Sugar Loaf Mt., 650–750 m., on twigs, F. C. Deighton M4441A.

Cameroons: Tombel on *Theobroma*, C. A. Thorold 136, 138.

PYRENULA MAMILLANA (Ach.) Trev., Conspect. Verruc. 13. 1860.

Verrucaria mamillana Ach., Meth. Lich. 120. 1803.

Type: Sierra Leone, corticole, Afzelius.

Thallus epiphloeodal, deep olive buff, about 65 μ thick; cortex 15 μ thick, decomposed, filled with minute granules; medulla 50 μ thick, of slender, compact, periclinal hyphae with *Trentepohlia* filaments and cylindric cells 4–5 μ in diameter, not clearly aggregated as an algal layer. Perithecia solitary, up to 1 mm. in diameter and 0.6 mm. tall, hemispheric with a slight papilla about the ostiole, base flat, surface dull and very minutely and shallowly pitted (seen only under 36$\times$ magnification); parathecium 50 μ thick at the ostiole, rather abruptly thickening to 100 μ and then tapering to 130 μ at the base and prolonged another 130 μ as

wings, thinning to 40–50 μ under the hypothecium, the whole carbonaceous and brittle; hypothecium scarcely differentiated, groups of asci radiating from various points as if produced by different ascogonia; asci cylindric, 8-spored, about 110 × 8–9 μ; paraphyses slender and dichotomously branched, the thecial gel filled with oil droplets; ascospores ellipsoid, fuscous, 4-locular, 17–21 × 7–8 μ, protoplasts rounded, central ones about 3 μ in diameter, apical ones somewhat smaller.

Sierra Leone: Kanema (Nongowa), on *Copaifera copallifera,* F. C. Deighton M5013.

Nigeria: Ojo Province, Iseyin, on *Theobroma,* C. A. Thorold 103.

Cameroons: Tombel, on *Theobroma,* C. A. Thorold 136.

ANTHRACOTHECIUM

ANTHRACOTHECIUM Hampe in Mass., Atti I. R. Ist. Veneto III, 5:330. 1860.

Bottaria sect. *Anthracothecium* Vainio, Etude Lich. Brésil 2:196. 1890.

Type: *A. Doleschalii* Mass.

Thallus uniform, crustose, endo- or epiphloeodal, with *Trentepohlia* algae. Perithecia solitary or sometimes aggregated but not forming a pseudostroma, usually nearly covered by the thallus; parathecium carbonaceous (sect. *Euanthracothecium*) or light-colored with a darkened area about the ostiole (sect. *Porinastrum*), usually entire; paraphyses unbranched and free; asci 1–8-spored; ascospores ellipsoidal, muriform, with rounded protoplasts, brown; spermatia acicular, often curved.

Since *A. euthelium* (Nyl.) Zahlbr. and *A. lugescens* (Nyl.) Zahlbr. were described as having hyaline, muriform spores, they may belong in *Clathroporina* rather than in *Anthracothecium* where Zahlbruckner transferred them.

1. Spores 7–12 × 5–7 μ, dwarf-muriform, 4-locular with the two middle cells divided by a longitudinal septum; Usambara 2
1. Spores less than 100 μ long, muriform 3
1. Spores over 200 μ long, hyaline; São Thomé (perhaps belong in *Clathroporina*) 4
2. Thallus white; perithecia about 0.1 mm. in diameter ..... *A. punctuliforme* Müll. Arg.
2. Thallus orange-yellow; perithecia 0.7 mm. in diameter ..... *A. vitellinum* Müll. Arg.
3. Spores 50–60 × 22–25 μ; thallus ashy, black-margined; Guinea ..... *A. cinerosum* (Ach.) Müll. Arg.
3. Spores 80–95 × 32–35 μ; thallus pale olive buff to smoke gray; perithecia 2.5 mm. in diameter; Ilha Principe ..... *A. guineense* (Nyl.) Zahlbr.
4. Spores 210–230 × 45–75 μ; asci monosporous; perithecia 0.5 mm. in diameter ..... *A. lugescens* (Nyl.) Zahlbr.
4. Spores 275–300 × 25–27 μ, fusiform; asci 8-spored; perithecia 1 mm. in diameter ..... *A. euthelium* (Nyl.) Zahlbr.

ANTHRACOTHECIUM GUINEENSE Zahlbr., Cat. Lich. Univ. 1:462. 1922.

Verrucaria guineensis Nyl., Lich. Insul. Guineens. 36. 1889.

Type: Ilha Principe, at sea-shore, corticole, Quintas.

Thallus epiphloeodal, pale olive buff to smoke gray, about 65 μ thick; cortex 40 μ thick, of slender, conglutinate, periclinal hyphae; algal layer discontinuous, up to 25 μ thick, cells about 6 μ in diameter, not in distinct filaments and somewhat angular from mutual pressure, *Trentepohlia;* medulla not developed, but the fungus hyphae penetrating deeply into the bark. Perithecia solitary, about 2.5

mm. in diameter, 0.9 mm. tall, covered with a thin layer of thalline cortex to near the ostiole; parathecium 125 μ thick near the ostiole, expanding to 600 μ thick at the base, 125 μ thick under the hypothecium, carbonaceous, with a very dense inner layer about 125 μ thick next the nucleus, the rest of thick-walled pseudoparenchyma with occasional small cavities (remains of old spermogonia?); nucleus subspherical, becoming conic in very old perithecia, 1200–1300 μ in diameter; hypothecium 50 μ thick, of densely woven, deeply staining, slender hyphae; paraphyses slender, dichotomously branched in the thecial gel; asci cylindric, disappearing before the spores mature; ascospores brown, broadly ellipsoid, 14-locular, 8-locellate, 80–95 $\times$ 32–35 μ.

The relation of this species to *A. cinerosum* (Ach.) Müll. Arg. is not clear. It agrees in most characters with Müller Argau's description of the Acharian type except in spore size. Ascospores, already free of the ascus and just beginning to assume the smoky color of immature brown spores, fall within the measurements given for *A. cinerosum*. They apparently increase in size at the expense of the thecial gel as they mature and become dark brown. If Müller Argau measured such spores and failed to find the very dark brown mature spores, *A. guineensis* may be a synonym of *A. cinerosum* (Ach.) Müll. Arg. I referred my material to the latter species before I found the very dark brown spores in another perithecium on the same thallus. Only a developmental study of these species can settle the synonymy. Sections of one "perithecium" of *Thorold 104* show two perithecia concrescent with a common wall and ostiole, and might be mistaken for *Parmentaria Chevalieri* Bouly de Lesdain.

Nigeria: on *Theobroma*, C. A. Thorold 104; Aponmu near Akure, on *Theobroma*, C. A. Thorold 172.

Trypetheliaceae

Thallus crustose, uniform, epi- or endophloeodal; ecorticate or corticate (never pseudoparenchymatous); algae *Trentepohlia;* several perithecia (rarely only 1 or 2) immersed in each well-developed pseudostroma, erect, with central, individual ostiole; spermatia exobasidial.

1. Ascospores hyaline 2
1. Ascospores brown 5
   2. Ascospores unicellular ..... *Riddlea* Dodge
   2. Ascospores septate, usually 4- or more celled 3
   2. Ascospores muriform ..... *Laurera* Reichb.
3. Ascospores thin-walled, protoplasts cylindric or nearly so ..... *Tomasellia* Mass.
3. Ascospores thick-walled, protoplasts rounded or lenticular 4
   4. Ascospores 2–4-locular, small ..... *Bathelium* Ach.
   4. Ascospores 6–many-locular, large ..... *Trypethelium* Sprgl.
5. Ascospores septate, usually 4 or more celled, protoplasts rounded or lenticular ..... *Melanotheca* Fée
5. Ascospores muriform ..... *Bottaria* Mass.

RIDDLEA

Riddlea Dodge, gen. nov.

Type: *R. papillosa* Dodge.

Thallus crustosus, epiphloeodes; cortex decompositus; algae *Trentepohlia.* Pseudostromata carnea; perithecia immersa, integra; hypothecia in pulvinulis lenticularibus, plura in quovis perithecio; paraphyses dichotome ramosae anastomosantesque; asci longe stipitati; ascosporae octonae, hyalinae, fusiformes, uniloculares; spermogonia in verrucis thallinis immersa; perifulcrum nigrum; spermatiophorae ampullaceae; spermatia acicularia, recta.

Thallus epiphloeodal, sometimes separating from the bark and appearing subfoliose, but without a lower cortex; cortex decomposed; algae *Trentepohlia.* Pseudostromata soft and fleshy, thalline when young, the algae finally dying and leaving lacunae, variable in shape; perithecia immersed in the pseudostroma, ostioles central; parathecium black; several hypothecia per perithecium, lenticular; paraphyses dichotomously branched and anastomosing; asci long-stipitate, very thick-walled when young, the wall thinning as the ascospores mature, 8-spored; ascospores hyaline, fusiform, unilocular; spermogonia immersed in thalline warts, wall black; spermatothecium folded into labyrinthiform cavities; spermatiophores flask-shaped; spermatia acicular, straight, relatively short.

The fungus component of this genus does not seem closely related to other lichen-forming fungi. The placenta-like cushions from which the long-stalked asci radiate are suggestive of the Coronophorales, but true paraphyses are present and the pseudostroma is quite different. Although the pseudostroma is essentially thalline (i.e. containing algae), it shows little relation to *Coccotrema,* which perhaps belongs in the Pertusariaceae (close to or the same as *Perforaria*) rather than in the Pyrenulaceae. For the present we include *Riddlea* in the Trypetheliaceae, analogous to *Monoblastia* of the Pyrenulaceae, although the relationship does not seem close.

I take pleasure in dedicating this genus to my late friend, Professor Lincoln W. Riddle of Harvard University, who first described *Monoblastia.*

RIDDLEA **papillosa** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Anisophyllea laurina,* F. C. Deighton M4624.

Thallus epiphloeodes, pallide flavo-olivaceus, 75 μ crassitudine; cortex 10 μ crassitudine, decompositus, minutis cum granulis obscuris; stratum algarum 65 μ crassitudine, filamentis verticalibus *Trentepohliae,* 6.5 μ diametro, cellulis cylindricis isodiametricis, dense compactis; medulla non evoluta. Pseudostromata carnea, thallina cum cellulis algarum inter perithecia morientibus, dein lacunata, alia subsphaerica ca. 1 mm. diametro, alia in pulvinulos applanatos 2–3 mm. diametro, alia sublinearia, hyphis hyalinis 2 μ diametro, cortice thallino tecta; perithecia 370 μ diametro, 250 μ altitudine, oblate sphaeroidea, cervice 100 μ longitudine superne tenuescente ad ostiolum parvum in papilla applanata; parathecium in-

tegrum, nigrum, 15 μ crassitudine; hypothecia plura in quovis perithecio, pulvini lenticulares, 135 μ diametro, centro 40 μ crassitudine; paraphyses tenues, dichotome ramosae anastomosantesque, apicibus liberis; asci 200 $\times$ 30 μ, juventute pachydermei, stipitibus 100 $\times$ 5 μ, venter clavatus vel fusiformis, 100 $\times$ 30 μ; ascosporae octonae, distichae, hyalinae, fusiformes, uniloculares, 24–32 $\times$ 8–11 μ, tenui cum halone. Spermogonia in verrucis thallinis immersa, sphaerica, 250 μ diametro; perifulcrum nigrum, 15 μ crassitudine, hyphis tenuibus periclinalibus; spermatothecium plicatum; spermatiophorae ampullaceae, 10 μ longitudine, venter 2 μ diametro, cervice elongato tenuescente; spermatia acicularia recta, ca. 10 $\times$ 1 μ.

Thallus crustose, epiphloeodal, light yellowish olive, about 75 μ thick, sometimes separating from the bark and appearing subfoliose but lacking a lower cortex; upper cortex about 10 μ thick, decomposed, with minute dark granules (appearing black in thick sections); algal layer 65 μ thick, of *Trentepohlia* filaments, vertical, closely packed, cells cylindric, more or less isodiametric, about 6.5 μ in diameter; medulla not differentiated but hyphae penetrate some distance into the bark cells. Pseudostromata soft, fleshy, of thalline tissue, i.e. containing masses of algal cells between the young perithecia, dying and leaving lacunae, very variable in size and shape, some subspherical, about 1 mm. in diameter, others in flattened cushions 2–3 mm. in diameter while others are elongate and sublinear, composed of closely woven hyaline hyphae about 2 μ in diameter, with masses of algal cells between the young perithecia, covered by the thin thalline cortex; perithecia 370 μ in diameter, 250 μ tall, oblate-spheroidal, with a short neck (about 100 μ long), tapering upward to a small ostiole surrounded by a low, broad papilla; parathecium entire, black, 15 μ thick; hypothecia several per perithecium, as lenticular, placenta-like cushions about 135 μ in diameter and 40 μ thick in the center, from which tufts of asci and paraphyses radiate into the thecial gel; paraphyses slender, dichotomously branched and anastomosing, tips free; asci 200 $\times$ 30 μ, very thick-walled when young, the lower half a stipe about 5 μ in diameter, the upper half clavate to fusiform, the wall thinning as the ascospores mature, 8-spored; ascospores distichous, hyaline, fusiform, unilocular, 24–32 $\times$ 8–11 μ, with a thin halo. Spermogonia immersed in thalline warts, about 250 μ in diameter, wall black, 15 μ thick, of slender periclinal hyphae; spermatothecium folded into labyrinthiform cavities; spermatiophores about 10 μ long, flask-shaped with a long tapering neck, venter about 2 μ in diameter; spermatia acicular, straight, about 10 $\times$ 1 μ.

In habit *Riddlea papillosa* suggests Bathelium **papillosum** (Ach.) Dodge, comb. nov. (*Trypethelium papillosum* Ach., Syn. Lich. 104. 1814), and I had tentatively referred my material to that species until I found the mature unicellular ascospores, since the ascospores while still in the ascus are about the size of those of *B. papillosum* before the septa are visible.

BATHELIUM

Bathelium Ach., Meth. Lich. 111. 1803, *non* Mass. 1860.

Leightonia Trev., Flora 44:19. 1861.

Trypethelium sect. *Bathelium* Müll. Arg., Bot. Jahrb. [Engler] 6:589. 1885.

Pseudopyrenula subg. *Trypethelium* sect. *Bathelium* Vainio, Etude Lich. Brésil 2:206. 1890.

Type: *B. mastoideum* Afzelius in Ach. *Leightonia* was based on *Trypethelium porosum* Ach.

Thallus crustose, epi- or endophloeodal, cortex thin, gelified, algae *Trentepohlia*. Pseudostromata hemispheric or more flattened and irregular; perithecia ellipsoid to spherical, wall entire; asci 8-spored; ascospores hyaline, ellipsoid, 2–4-locular, protoplasts rounded.

1. Pseudostromata often containing a single perithecium; ascospores 20 × 8 μ, apical cells larger than middle cells; Mozambique ..... *B. duplex* f. *simplicius* (Vainio) Dodge
1. Pseudostromata normally containing several perithecia 2
   2. Papillate about the ostiole [papilla sometimes breaking away in very old perithecia]; thallus ashy olive to fuscous 3
   2. Not papillate about the ostiole; thallus white or nearly so 4
   2. Upper part of the pseudostroma breaking away forming an ostiole 250 μ in diameter; thallus deep olive buff; ascospores 19–21 × 8–9 μ, long remaining hyaline but finally brown when fully mature; Sierra Leone ..... *Melanotheca porosa* Dodge
3. Ascospores 18–22 × 7–8 μ; Sierra Leone ..... *B. mastoideum* Ach.
3. Ascospores 20–27 × 8–9 μ; Guinea ..... *B. papillosum* (Ach.) Dodge
   4. Ascospores 20 × 8 μ, with halo; Mozambique ..... *B. compositum* (Vainio) Dodge
   4. Ascospores 28–33 × 9–10 μ; São Thomé ..... *B. subalbens* (Nyl.) Dodge

BATHELIUM MASTOIDEUM Afzelius in Ach., Meth. Lich. 111. 1803.

Trypethelium mastoideum Ach., Lichenogr. Univ. 307. 1810.

Type: Sierra Leone, corticle, Afzelius.

Thallus epiphloeodal, 100 μ thick, deep olive buff, conspicuously black-margined; cortex 55 μ thick, of vertical, slender interwoven hyphae in a gel; algal layer 45 μ thick, of predominantly periclinal hyphae and disorganized filaments of *Trentepohlia* in a gel; medulla not differentiated but hyphae penetrating the underlying bark cells. Pseudostromata hemispheric, confluent into irregular masses containing 1–10 perithecia, fuscous, yellow within at first, blackening and carbonaceous in age, with a low papilla about the ostiole which soon cracks off; parathecium fusing with the stroma; nucleus rounded at first, becoming subconic, 280 μ in diameter at the base, 100 μ at the ostiole and 185 μ tall, the pseudostroma extending 80 μ below the nucleus and resting on the bark cells; hypothecium 12–14 μ thick, of slender, closely woven, predominantly periclinal hyphae; paraphyses dichotomously branched and anastomosing in the nuclear gel, about 150 μ tall; asci fusiform with rounded tips, 8-spored, about 80 × 14–16 μ; ascospores distichous, hyaline, ellipsoid, 4-locular, with large, subequal, rounded protoplasts, 18–22 × 7–8 μ.

Sierra Leone: Njala (Kori), on bark of *Anisophyllea laurina*, F. C. Deighton M4625.

BATHELIUM **compositum** Dodge, comb. nov.

Pseudopyrenula composita Vainio, Bol. Soc. Broter. II, 6:177. 1929.
Trypethelium compositum Zahlbr., Cat. Lich. Univ. 10:101. 1938.

BATHELIUM DUPLEX f. **simplicius** Dodge, comb. nov.
Pseudopyrenula duplex f. *simplicior* Vainio, Bol. Soc. Broter. II, 6:177. 1929.
Trypethelium duplex f. *simplicius* Zahlbr., Cat. Lich. Univ. 10:101. 1938.

BATHELIUM **papillosum** Dodge, comb. nov.
Trypethelium papillosum Ach., Syn. Lich. 104. 1814.

BATHELIUM **porosum** Dodge, comb. nov.
Trypethelium porosum Ach., Syn. Lich. 106. 1814.
Verrucaria porosa Eschw. in Martius, Fl. Brasil. 1:135. 1833.
Leightonia porosa Trev., Flora 44:19. 1861.
Trypethelium Sprengelii v. *porosa* Nyl. in Hue, Nouv. Arch. Mus. [Paris] III, 4:129. 1892.

BATHELIUM **subalbens** Dodge, comb. nov.
Trypethelium subalbens Nyl., Flora 69:178. 1886.

TRYPETHELIUM

TRYPETHELIUM Sprengel, Einleitung in das Studium der kryptogamischen Gewächse, 350. 1804 [often cited as Anleitung zur Kenntniss der Gewächse 3].
Trypethelium sect. *Eutrypethelium* Müll. Arg., Bot. Jahrb. [Engler] 6:393. 1885.
Pseudopyrenula subg. *Trypethelium* sect. *Eutrypethelium* Vainio, Etude Lich. Brésil 2:204. 1890.
Type: *T. Eluteriae* Sprgl.

Thallus crustose, epi- or endophloeodal, cortex gelified, thin; algae *Trentepohlia*. Pseudostromata hemispheric, or flattened and irregular, usually of a different color than the thallus, containing 2 to many perithecia, which are ellipsoidal or spherical, ostiole central, parathecium entire, carbonaceous; paraphyses branched and anastomosing; asci 8-spored; ascospores long-fusiform, hyaline, 6–22-locular, protoplasts rounded.

1. Pseudostromata blood-red, surface pruinose; thallus ashy; ascospores unknown, so perhaps belonging in *Bottaria* or *Melanotheca* which have species with red pseudostromata; Congo ..... *T. coccinatum* Stzbgr.
1. Pseudostromata not blood-red 2
2. Ascospores acicular, 18–22-locular, 56 × 2.5 μ; Nyasaland ..... *T. aciculare* Dodge
2. Ascospores much broader, ellipsoid to fusiform 3
3. Ascospores 6–8-locular, 188 × 42 μ; thallus and pseudostromata olive-glaucescent; Angola ..... *T. pustulatum* (Vainio) Zahlbr.
3. Ascospores 10–14-locular 4
3. Ascospores 16–18-locular, 85–110 × 15–18 μ; ostioles white; São Thomé ..... *T. leucostomum* (Nyl.) Dodge
4. Ascospores 10–14-locular, 55 × 14 μ; thallus olive ochre; pseudostromata yellow ochre, dark fuscous within, 0.5 mm. tall, elongate and irregular; Guinea ..... *T. anomalum* Ach.
4. Ascospores 14-locular, 80–85 × 14–18 μ; thallus pale, sulfur-pruinose; pseudostromata 1 mm. tall, subspheric, finally black with 2–6 perithecia; Angola ..... *T. sphaerocephalum* (Vainio) Zahlbr.

TRYPETHELIUM **aciculare** Dodge, sp. nov.

Type: Nyasaland, Kasungu Hill, 1100 m., corticole, L. J. Brass 17458a.

Thallus epiphloeodes, glaber, subrimulosus, 135 μ crassitudine, olivaceus, margine plumoso, 3 mm. latitudine, homoeomerus; filamentis *Trentepohliae* plus minusve verticalibus, 6–8 μ diametro. Pseudostromata thallina, pulvinata, irregulariter rotundata, 1 mm. diametro, cum 12–20 peritheciis; perithecia ellipsoidea; parathecium integrum, 12–15 μ crassitudine, pseudoparenchymaticum, ex hyphis periclinalibus superne obscurum, inferne hyalinum; hypothecium non bene evolutum; paraphyses dichotome ramosae anastomosantesque, apicibus liberis, 1.5 μ diametro; asci cylindrici pachydermei juventute, 60 $\times$ 8 μ; ascosporae octonae, fasciculatim dispositae, hyalinae, 18–22-loculares, protoplastis rotundatis, aciculares, subcurvatae, apicibus obtusis, 56 $\times$ 2.5 μ.

Thallus epiphloeodal, somewhat rimulose, 135 μ thick, citrine drab to deep olive, margin 3 mm. wide, of radiating, plumose strands; homoeomerous, the filaments of *Trentepohlia* more or less vertical, 6–8 μ in diameter. Pseudostromata thalline, pulvinate, irregularly rounded, 1 mm. in diameter, containing 12–20 ellipsoidal perithecia; parathecium entire, 12–15 μ thick, pseudoparenchymatous from periclinal hyphae, the upper portion dark brown shading to hyaline below; hypothecium scarcely differentiated; paraphyses dichotomous and anastomosing, 1.5 μ in diameter, tips free in the thecial gel; asci cylindric, thick-walled when young, 8-spored, about 60 $\times$ 8 μ; ascospores fascicled, hyaline, 18–22-locular, protoplasts rounded, acicular, slightly curved, ends obtuse, 56 $\times$ 2.5 μ.

TRYPETHELIUM ANOMALUM Ach., Syn. Lich. 105. 1814.

Type: Specimens cited from the West Indies and Guinea, Afzelius. Müller Argau borrowed the Guinea specimen and found it a true *Trypethelium*, reducing it to synonymy with the later *T. platystomum* Mont. Vainio, presumably studying the West Indian material, referred it to *Melanotheca Achariana* Fée. Zahlbruckner followed the Müller Argau tradition and recognized the species as a true *Trypethelium*. Acharius' choice of the specific name is unfortunate as it is not an anomalous species in either *Trypethelium* or *Melanotheca*.

Thallus epiphloeodal, olive ochre, about 100 μ thick; cortex 30 μ thick, of predominantly periclinal, interwoven hyphae in a gel; algal layer 70 μ thick, of short, more or less vertical filaments of *Trentepohlia*. Pseudostromata yellow ochre, rounded, about 2 mm. in diameter or elongate and irregular from confluence, slightly constricted at the base, with many black papillae which fall away, leaving small pits; perithecia ellipsoid, about 360 μ in diameter and 500 μ tall; parathecium 30 μ thick, carbonaceous, surrounded by brown pseudostromatic tissue and covered by thalline cortex; hypothecium about 15 μ thick, of slender, densely woven hyphae; paraphyses dichotomous and anastomosing, tips free in the thecial gel; asci fusiform, 8-spored; ascospores imbricately distichous, hyaline, fusiform, one end obtuse, the other acute, 10–14-locular, protoplasts slightly rounded, 55 $\times$ 14 μ.

T. Perrotetii Fée (Ann. Sci. Nat. 23:432. 1831) may be a synonym, as Müller Argau reports that the type from Senegal, Cap Vert, Perrotet, is old and contains no spores. *T. leucostomum* (Nyl.) Dodge has white ostioles and much larger spores (85–110 × 15–18 μ).

Sierra Leone: Njala (Kori), on bark of *Anisophyllea laurina*, F. C. Deighton M4407.

TRYPETHELIUM **leucostomum** Dodge, comb. nov.

Trypethelium platystomum f. *leucostomum* Nyl., Flora 69:178. 1886.
Trypethelium anomalum f. *leucostomum* Zahlbr., Cat. Lich. Univ. 1:487. 1922.

MELANOTHECA

MELANOTHECA Fée, Suppl. Essai Crypt. Ecorces Officin. 70. 1837.

Arthopyrenia sect. *Melanotheca* Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges. 147. 1862.
Segestrella sect. *Melanotheca* Branth & Rostr., Bot. Tidsskr. 3:257. 1869.
Pyrenula subg. *Melanotheca* Vainio, Cat. Welwitsch Afric. Pl. 2:463. 1901.
Porothelium Eschw., Syst. Lich. 18. 1824, *non* Fr. 1818, 1821.
Porodothion Fries, Syst. Orb. Veg. 262. 1825.

Type: M. *Achariana* Fée (based on *Trypethelium anomalum* Ach., West Indian plants cited, not Afzelius' Guinea plant). *Porothelium* Eschw. and *Porodothion* Fr. were based on *P. arthonioides*, *Porina compuncta* Ach., *Trypethelium anomalum* Ach., and *T. conglobatum* Ach., all except *P. arthonioides* and part of *T. anomalum* belonging in *Trypethelium* as now understood. Since *Melanotheca* has been used in its present sense, either as a genus or subgenus since it was proposed, it should be conserved. It would be unwise to select *P. arthonioides* as the type of *Porodothion*, although it was figured by Eschweiler as the invalid *Porothelium* (renamed *Porodothion* by Fries) as all species of the present *Melanotheca* would have to be transferred to *Porodothion*.

Thallus crustose, epi- or endophloeodal; cortex often poorly developed or absent; algae *Trentepohlia*. Stroma or pseudostroma usually with several perithecia, irregularly rounded or sublinear; perithecia immersed; parathecium carbonaceous, ostiole central; paraphyses either unbranched or branched and anastomosing; asci usually 8-spored; ascospores brown to black, ellipsoidal or fusiform, 4- or more celled, with rounded protoplasts; spermatiophores simple; spermatia filiform, straight or curved.

1. Pseudostromata purple; ascospores 4-locular, 24 × 12 μ; Usambara....*M. purpurascens* Müll. Arg.
1. Pseudostromata cinnabar red to red; ascospores 4-locular, 20 × 8 μ; Kenya.....*Pyrenula Gravenreuthii* Stein
1. Pseudostromata not purple or red, usually dark-colored.....2
   2. Ascospores 10-locular; pseudostromata small; Abyssinia.....*M. pusilla* (Jatta) Dodge
   2. Ascospores 4-locular; pseudostromata larger 3
3. Ascospores 15 μ or less long 4
3. Ascospores more than 17 μ long 5

4. Ascospores narrowly ellipsoid, 15 × 4–5 μ; thallus fuscous olive; Mozambique.....*M. obscurascens* (Vainio) Dodge
4. Ascospores broadly ellipsoid, 13–14 × 8 μ; thallus drab to hair brown; Nigeria.....*M. nigeriensis* Dodge
5. Perithecia entire; ascospores 19–21 × 8–9 μ, apical cells much smaller than middle ones; top of perithecium cracking away to leave an opening about 250 μ in diameter; Sierra Leone .....*M. porosa* Dodge
5. Perithecia dimidiate or nearly so.....6
6. Ostiole white-annulate; ascospores 17–21 × 6–7 μ; Cameroons.....*M. cameroonensis* Dodge
6. Ostiole small, not white-annulate; ascospores 17–19 × 5.5–8 μ; Angola.....*M. angolensis* (Vainio) Dodge

MELANOTHECA **angolensis** (Vainio) Dodge, comb. nov.

Melanotheca Achariana var. *angolensis* Vainio, Cat. Welwitsch Afric. Pl. 2:453. 1901.

Type: Angola, Golungo Alto, near Sange, on *Entandrophragma angolensis*, Welwitsch 205.

Pseudostromata thin, ostiole small, without a white annulus; nucleus almost hemispheric or depressed conoid-subspherical; paraphyses unbranched; asci 8-spored; ascospores brown, 4-locular, protoplasts lenticular, 17–19 × 5.5–8 μ.

Welwitsch 187, from the type locality and on the same species of tree, is reported to have dimidiate perithecia and perhaps belongs in *M. cameroonensis* Dodge, but I have not seen this specimen.

The whole group of species centering about *Melanotheca Achariana* Fée needs a thorough revision based on the types of all the species and varieties proposed.

MELANOTHECA **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Ondo Province, Owena near Akure, on *Theobroma*, C. A. Thorold 170.

Thallus epiphloeodes, brunneus, 90–110 μ crassitudine; cortex 27–55 μ crassitudine, decompositus, hyphis tenuissimis, verticalibus, dense intertextis, gelifactis; stratum algarum 55–65 μ crassitudine, filamentis subverticalibus *Trentepohliae* 7–8 μ diametro. Perithecia (aut stromata cum peritheciis singulis aut binis) solitaria vel confluentia, hemispherica, nucleo conico, 0.6 mm. diametro, 0.4 mm. altitudine; parathecium (aut stroma) 125 μ crassitudine ad ostiolum centralem, ad basem 240 μ grandescens, 65 μ crassitudine sub hypothecio, carbonaceum, cortice thallino 10 μ crassitudine usque ad ostiolum tectum; ostiolum subumbilicatum; hypothecium 13–14 μ crassitudine, hyphis dense intertextis; asci cylindrici, evanescentes; ascosporae octonae, late ellipsoideae, obscure brunneae, 4-loculares, protoplastis rotundatis, subaequalibus, 13–14 × 8 μ.

Thallus epiphloeodal, drab to hair brown, 90–110 μ thick; cortex 27–55 μ thick, decomposed, of densely woven predominantly vertical, very slender, gelified hyphae. Perithecia (or stromata with one or two perithecia) solitary or aggregated into small groups, lentiform, becoming hemispheric with a conic nucleus about 0.6 mm. in diameter, 0.4 mm. tall; parathecium (or stroma) 125 μ thick at the ostiole, expanding to 240 μ thick at the base, about 65 μ thick under the hypothecium, covered by a thin layer of thalline cortex 10 μ thick all the way to the

slightly umbilicate ostiole, carbonaceous; hypothecium 13–14 μ thick, of densely woven hyphae; asci cylindric, 8-spored, soon disappearing; ascospores broadly ellipsoid, dark brown, 4-locular, protoplasts rounded, subequal, 13–14 $\times$ 8 μ.

The systematic position of this species is intermediate between *Pyrenula* and *Melanotheca*. When occurring in pairs, the perithecia appear innate in a carbonaceous stroma from the complete fusion of the parathecia and the stromatal tissue. Occasionally I have found abortive perithecia in the angles at the base when the perithecia appear solitary. Unfortunately, I have had no young material to study development. I have therefore included this species also in the key to the tropical African species of *Pyrenula*.

MELANOTHECA **porosa** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Anisophyllea laurina*, F. C. Deighton M4408.

Thallus epiphloeodes, glaber, obscure olivaceo-alutaceus; cortex 120–130 μ crassitudine, hyphis periclinalibus tenuibus dense intertextis, gelifactus, paucis cum cellulis suberosis hyalinis; stratum algarum 55 μ crassitudine, filamentis disintegratis *Trentepohliae* inter cellulos suberosos decompositos; medulla non evoluta. Pseudostromata parva, irregulariter rotundata aut frequenter confluentia, lenticularia, 0.5 mm. crassitudine, sublinearia curvataque; perithecia immersa, ostiolis ad 250 μ diametro; nucleus ca. 250 μ diametro, 300 μ altitudine, pyriformis; parathecium integrum, carbonaceum, 15 μ crassitudine; hypothecium 25 μ crassitudine, hyphis periclinalibus gelifactis; paraphyses tenues, dichotome ramosae, compactae; asci 65 $\times$ 13–14 μ; ascosporae octonae, imbricatim monostichae, hyalinae dein brunneae, late ellipsoideae, 4-loculares, protoplasti lenticulares, apicales conspicue minores, 19–21 $\times$ 8–9 μ.

Thallus epiphloeodal, smooth, deep olive buff; cortex 120–130 μ thick, of slender, interwoven, mostly periclinal hyphae in a gel, with hyaline remains of bark cells in the lower portion; algal layer 55 μ thick, of disorganized filaments of *Trentepohlia* among the remains of bark cells; medulla not differentiated but hyphae penetrating deeply into the brownish bark cells. Pseudostromata small, irregularly rounded or more frequently confluent into sublinear or curved masses, about 0.5 mm. thick, lenticular in cross-section; perithecia immersed, the overlying stroma cracking away, exposing the white top of the nucleus, thus making a pseudo-ostiole about 250μ in diameter; nucleus pyriform, about 250 μ in diameter, 300 μ tall; parathecium fusing with the stroma, entire, about 15 μ thick below the hypothecium, the bark cells below blackened to a depth of about 65 μ (the distinction visible in very thin sections); hypothecium 25 μ thick, of gelified, predominantly periclinal hyphae; paraphyses slender, dichotomous, very closely packed in the nuclear gel and then appearing simple; asci 8-spored, about 65 $\times$ 13–14 μ; ascospores imbricately monostichous, hyaline, finally brownish, broadly ellipsoidal, 4-locular, protoplasts lenticular, the apical ones conspicuously smaller, 19–21 $\times$ 8–9 μ while still smoky gray, shrinking slightly when fully brown.

At first sight, this species might be mistaken for *Bathelium porosum* (Ach.) Dodge, from the West Indies, but it lacks a papilla at any stage and has smaller ascospores. Although the spores remain hyaline until late, they become brown when fully mature.

MELANOTHECA **cameroonensis** Dodge, sp. nov.

Type: Cameroons, Tombel, on *Theobroma*, C. A. Thorold 142.

Thallus endophloeodes, obscure olivaceo-alutaceus, glaber, nigro-marginatus; pseudocortex 10 μ crassitudine, cellulis suberosis nigricantibus, decompositis, tenuibus cum hyphis dense contextis; filamenta *Trentepohliae* periclinalia, 5–6 μ diametro inter cellulas suberosas penetrantia. Pseudostromata irregularia, lateribus abruptis, 250–270 μ altitudine, nigra, ostiolis depressis, albis cum annulis, hyphis et cellulis suberosis decompositis; perithecia dimidiata, subsphaerica, 300 μ diametro, 220 μ altitudine; parathecium 40 μ crassitudine, carbonaceum; hypothecium 10 μ crassitudine, hyphis tenuibus, periclinalibus, dense intertextis; paraphyses tenuissimae, dichotome ramosae; asci cylindrici, evanescentes; ascosporae octonae, imbricatim monostichae, brunneae, 4-loculares, protoplastis rotundatis, 17–21 $\times$ 6–7 μ.

Thallus endophloeodal, deep olive buff, black-margined; pseudocortex about 10 μ thick, of disintegrated, blackened cork cells with partly decomposed, densely woven, slender hyphae; periclinal filaments of *Trentepohlia* 5–6 μ in diameter, penetrating deeply into the bark. Pseudostromata of disintegrated bark cells and hyphae, quite irregular in size and shape, black with abrupt sides, about 250–270 μ tall, ostioles slightly depressed, surrounded by white rings; perithecia dimidiate, subspherical, 300 μ in diameter, 220 μ tall, immersed in the pseudostromata; parathecium 40 μ thick, carbonaceous, finally indistinguishable from the blackened pseudostroma in old perithecia which have lost their nuclei and which usually have a thin layer of blackened bark cells at their base and so appear entire; hypothecium about 10 μ thick, of slender, densely woven, predominantly periclinal hyphae, nearly disappearing as the asci mature; paraphyses very slender, dichotomous in the nuclear gel; asci cylindric, 8-spored, wall early disappearing; ascospores imbricately monostichous, brown, ellipsoid, 4-locular, protoplasts round, apical ones only slightly smaller, 17–21 $\times$ 6–7 μ.

This species differs from *M. Achariana* Fée in having dimidiate, papillate perithecia with a white annulus and umbilicate ostiole and slightly longer and slenderer ascospores.

MELANOTHECA **obscurascens** (Vainio) Dodge, comb. nov.

Pyrenula (Melanotheca) obscurascens Vainio, Bol. Soc. Broteriana II, 6:35. 1929.
Trypethelium anomalum v. *obscurascens* Zahlbr., Cat. Lich. Univ. 10:101. 1938.
Melanotheca Achariana v. *obscurascens* Zahlbr., Cat. Lich. Univ. 10:100. 1938.

Type: Mozambique, Tungue Bay, Palma, 10° 5′ S. lat., Americo Pires de Lima.

Thallus fuscous olive; perithecia partly solitary or confluent into pseudostromata; spores fuscous, 4-locular, 15 $\times$ 4–5 μ.

The dark thallus, more solitary perithecia, and smaller ascospores, should separate this species from all other members of the *M. Achariana* group.

MELANOTHECA **pusilla** Dodge, comb. nov.

Trypethelium pusillum Jatta, Nuovo Giorn. Bot. Ital. 14:174. 1882.

LAURERA

LAURERA Reichb., Der Deutsche Botaniker seu Repert. Herbar. 15. 1841.

Meissneria Fée, Suppl. Essai Crypt. Ecorc. Officin. 65. 1837, *non* DC.
Meristosporum Mass., Atti I. R. Ist. Veneto III, 5:327. 1860.
Thelenella sect. *Meristosporum* Vainio, Etude Lich. Brésil 2:215. 1890.
Bathelium Trev., Flora 44:21. 1861 *p. p.*; Müll. Arg., Bot. Jahrb. [Engler] 6:394. 1885.

Type: M. *varia* Fée. *Meristosporum* Mass. was based on *Trypethelium meristosporum* Mont. & v. d. Bosch. *Bathelium* Trev. was intended to be the same as *Bathelium* Ach., but included species with muriform spores, citing *Meissneria varia* Fée among others. Müller Argau treated *Bathelium* Ach. as a section of *Trypethelium* and retained *Bathelium* Trev. (citing *Meristosporum* Mass. as a synonym) for the species with hyaline, muriform spores.

Thallus crustose, epi- or endophloeodal, ecorticate, with *Trentepohlia* algae. Pseudostromata containing two or more perithecia with carbonaceous parathecia; paraphyses branched and anastomosing; asci 2–8-spored; ascospores muriform, hyaline, with more or less cubical cells. This genus is the stromatic analogue of *Polyblastiopsis* and *Clathroporina*. Although widespread in the tropics, it has hitherto been reported only from Mozambique and Socotra Island, except for *Trypethelium marginatum* Fée from Senegal, Cap Vert, formerly considered a synonym of *L. madreporiformis* (Eschw.) Riddle.

1. Ascospores under 40 μ long, 4–8-locular 2
1. Ascospores over 40 μ long, 8–20-locular 4
   2. Stromata 1.5–2 mm. in diameter; ascospores 25–38 × 10–15 μ, 6–8-locular, 2–3 locellate; perithecia dimidiate; Socotra ..... *L. velata* (Müll. Arg.) Zahlbr.
   2. Stromata less than 0.6 mm. in diameter; ascospores less than 30 μ long 3
3. Ascospores 4–6-locular, 1–3 locellate, 25 × 4–10 μ; perithecia dimidiate; Socotra ..... *L. pauperrima* (Müll. Arg.) Zahlbr.
3. Ascospores 8-locular, 1–3-locellate, 30 × 11 μ; Mozambique ..... *L. astroidella* (Vainio) Zahlbr.
   4. Ascospores 12–20-locular, 40–75 × 12–15 μ; pseudostromata dark reddish brown with 2–5 perithecia each; Senegal ..... *L. marginata* (Fée) Dodge
   4. Ascospores 10-locular; Mozambique 5
   4. Ascospores 8–10-locular, 2–4-locellate, 42–45 × 14–16 μ; pseudostromata immersed in the bark, black; Nigeria ..... *L. nigeriensis* Dodge
5. Pseudostromata dark fuscous, nude, constricted at the base, 0.8 mm. in diameter; ascospores 63 × 14 μ ..... *L. elegans* (Vainio) Zahlbr.
5. Pseudostromata substramineous to white, covered by thallus, not constricted at the base, 1 mm. in diameter with 2–5 perithecia; ascospores 50–75 × 19–22 μ ..... *L. ochroleucodes* (Vainio) Zahlbr.

LAURERA **marginata** Dodge, comb. nov.

Trypethelium marginatum Fée, Ann. Sci. Nat. 23:433. 1831.

LAURERA **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Moor plantation near Ibadan, on *Theobroma*, C. A. Thorold 165.

Thallus epiphloeodes, roseo-alutaceus, 30 μ crassitudine; cortex 10 μ crassitudine, decompositus; stratum algarum 20 μ crassitudine cellulis *Trentepohliae* et suberosis disintegratis. Pseudostromata 370 μ altitudine in cortice arboris immersa, irregularia, ostiolis inconspicuis; parathecium 10–12 μ crassitudine, integrum; nucleus pyriformis, 175 μ diametro, 360 μ altitudine, ostiolo 40 μ diametro; hypothecium 16–18 μ crassitudine, hyphis tenuibus dense contextum; paraphyses tenues, dichotome ramosae; asci clavati, 110 $\times$ 28 μ, evanescentes; ascosporae octonae, irregulariter distichae, hyalinae, murales, 8–10-loculares, 2–4-locellatae, protoplastis rotundatis, ellipsoideae vel subfusiformes, 42–45 $\times$ 14–16 μ.

Thallus epiphloeodal, cinnamon buff to pinkish buff, about 30 μ thick; cortex about 10 μ thick, the outer half decomposed, the inner half with structure obscured by dark granules; algal layer not sharply differentiated, about 20 μ thick, of intermingled cells of *Trentepohlia* and disintegrating cork cells. Pseudostromata black, about 370 μ thick, immersed in the bark, protruding about 30 μ, nude, very irregular in shape and size, ostioles very inconspicuous; parathecium entire, 10–12 μ thick at the base, fused with the pseudostroma above, later the underlying bark cells blackening to a depth of 50 μ; nucleus pyriform, about 175 μ in diameter, 360 μ tall, ostiole about 40 μ in diameter; hypothecium 16–18 μ thick, of densely woven, slender hyphae; paraphyses slender, dichotomously branched; asci clavate, 8-spored, about 110 $\times$ 28 μ, wall disappearing early; ascospores irregularly distichous, hyaline, muriform, 8–10-locular, 2–4-locellate, protoplasts slightly rounded, ellipsoid to subfusiform, 42–45 $\times$ 14–16 μ.

ASTROTHELIACEAE

Thallus crustose, uniform, epi- or endophloeodal (epilithic in *Lithothelium*); cortex absent or poorly developed; algae *Trentepohlia;* perithecia pyriform with long necks, usually radially arranged, nearly free or more often immersed in a stroma or pseudostroma, the necks often confluent, opening into a common ostiolar canal, rarely remaining separate, each with its own ostiole; spermatia exobasidial.

1. Ascospores septate, 3–8-locular 2
1. Ascospores muriform 4
2. Ascospore protoplasts cylindric or neary so; saxicole ..... *Lithothelium* Müll. Arg.
2. Ascospore protoplasts rounded or lenticular; corticole 3
3. Ascospores hyaline ..... *Astrothelium* Eschew.
3. Ascospores brown ..... *Pyrenastrum* Eschew.
4. Ascospores hyaline ..... *Cryptothelium* Mass.
4. Ascospores brown ..... *Parmentaria* Fée

PYRENASTRUM

PYRENASTRUM Eschw., Syst. Lich. 16. 1824.

Type: *P. septicolare* Eschw. may be chosen as the type, since *P. plicatum* described at the same time apparently has not been recognized since.

Thallus crustose, endo- or epiphloeodal, ecorticate or with a cartilaginous

almost amorphous cortex; algae *Trentepohlia.* Perithecia innate in the bark or nearly so, usually radially arranged with long concrescent necks opening in a common ostiole; parathecium entire; paraphyses branched and anastomosing; asci 4–8-spored; ascospores ellipsoid to fusiform, brown, 4–8-locular with rounded or lentiform protoplasts.

1. Perithecia spherical, 370 μ in diameter; ascospores 16–27 × 8–14 μ; Sierra Leone..... ..... *P. pruinosum* Dodge
1. Perithecia ellipsoidal 2
   2. Ascospores 13–14 × 5–6 μ; perithecia erect, 190 μ in diameter, 240 μ tall; Sierra Leone ..... *P. erumpens* Dodge
   2. Ascospores 17–19 × 5–6 μ, perithecia recumbent, 100 μ in diameter, 180μ long; Sierra Leone ..... *P. parathelioides* Dodge

PYRENASTRUM **pruinosum** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Anisophyllea laurina,* F. C. Deighton M4409.

Thallus endophloeodes, superficie olivaceo-alutacea, 250 μ crassitudine, hyphis dense intertextis et cellulis *Trentepohliae.* Pseudostromata elongata, ca. 2 mm. latitudine, in reticulo concrescentia, thallo pallidiora et plus pruinosa, verrucis hemisphaericis ad 1 mm. diametro ostiolo circumdantibus; ectostroma carbonaceum in cortice arboris 600 μ penetrans; endostroma pallidum, perithecia continens; perithecia subsphaerica, longis cum cervicibus, circum ostiolum commune ad 375 μ diametro radiantia; parathecium 15 μ crassitudine, carbonaceum, integrum; hypothecium 25 μ crassitudine, hyphis tenuibus dense contextum; paraphyses tenues, dichotome ramosae anastomosantesque, apicibus liberis; asci cylindrici, ca. 80 × 12 μ; ascosporae octonae, ellipsoideae, brunneae, 4-loculares, protoplastis rotundatis, subaequalibus, 16–27 × 8–14 μ.

Thallus endophloeodal, surface deep olive buff to olive buff, completely disorganizing the bark cells to a depth of 250 μ, filling them with slender, densely tangled hyphae and including disorganized filaments of *Trentepohlia,* not in a definite layer. Pseudostromata elongate, about 2 mm. wide, concrescent into a network, paler than the thallus and more pruinose, with small hemispheric verrucae about the ostioles up to 1 mm. in diameter; ectostroma carbonaceous, extending about 600 μ deep into the bark; endostroma not darkened, containing the perithecia, up to 375 μ in diameter, subspherical with long necks, radially arranged about the common ostiole; parathecium entire, 15 μ thick, carbonaceous; hypothecium 25 μ thick, of slender, densely woven hyphae; paraphyses dichotomously branched and anastomosing, tips free; asci cylindric, 8-spored, about 80 × 12 μ; ascospores ellipsoidal, brown, 4-locular with rounded, nearly equal protoplasts, 16–27 × 8–14 μ.

PYRENASTRUM **erumpens** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Phyllanthus discoideus,* F. C. Deighton M4397.

Thallus epiphloeodes, alutaceus, ca. 80 μ crassitudine; cortex 25 μ crassitudine, hyphis pachydermeis, periclinalibus, gelifactus; stratum algarum 55 μ crassitudine,

cellulis cylindricis *Trentepohliae*, 8 μ diametro; medulla non evoluta. Stromata erumpentia, carbonacea, orbicularia, 2 mm. diametro vel elongata, 1.5 $\times$ 4 mm., vel irregularia, parva, duobus cum ostiolis depressis, majora cum 15–20 ostiolis; ectostroma 100 μ crassitudine ab endostromate faciliter separans; perithecia ellipsoidea, 190 μ diametro, 240 μ altitudine, cervicibus excentricis brevibus in cervice communi aperientibus, 60 μ diametro ad ostiolum, inferne latiore, 150 μ altitudine; parathecium ab endostromate carbonaceo non distinctum; hypothecium 15 μ crassitudine, hyphis tenuibus dense contextum; paraphyses parce ramosae, apicibus liberis; ascosporae octonae, imbricatim monostichae, brunneae, 4-loculares, protoplastis rotundatis, subaequalibus, 13–14 $\times$ 5–6 μ.

Thallus epiphloeodal, deep colonial buff, about 80 μ thick; cortex 25 μ thick, of densely woven, mostly periclinal hyphae, highly gelified; algal layer 55 μ thick, of disoriented, subcylindric cells of *Trentepohlia*, 8 μ in diameter; medulla not differentiated. Stromata erumpent, carbonaceous, circular, about 2 mm. in diameter, or elongate, about 1.5 $\times$ 4 mm., or quite irregular, the smaller ones with only 2 depressed ostioles, the larger with 15–20 ostioles; the ectostroma about 100 μ thick, tending to crack away from the equally carbonaceous endostroma in sectioning; perithecia ellipsoidal, about 190 μ in diameter, 240 μ tall, neck excentric, rather short, opening into the common neck of the group, about 60 μ in diameter at the ostiole, wider below, about 150 μ tall; parathecium not distinct from the endostroma; hypothecium about 15 μ thick, of slender, densely woven hyphae; paraphyses little-branched, tips free; asci 8-spored; ascospores imbricately monostichous, brown, 4-locular, protoplasts rounded, subequal, 13–14 $\times$ 5–6 μ.

PYRENASTRUM **parathelioides** Dodge, sp. nov.

Type: Nigeria, Moor plantation near Ibadan, on *Theobroma*, C. A. Thorold 169.

Thallus epiphloeodes, olivaceo-alutaceus, 65 μ crassitudine; cortex 55 μ crassitudine, gelifactus, hyphis tenuissimis periclinalibus; stratum algarum 10 μ crassitudine, cellulis *Trentepohliae* compactis; medulla non evoluta. Stromata 0.6–0.7 mm. diametro, 0.2 mm. altitudine, carbonacea, lenticularia, thallo tecta, senectute dimidia parte supera frangente ut in speciebus *Pyrenulae;* perithecia solitaria vel geminatim disposita, cervicibus brevibus in ostiolo communi aperientibus, ellipsoidea, 100 μ diametro, 180 μ longitudine; parathecium integrum, 12–15 μ crassitudine, carbonaceum; hypothecium 20 μ crassitudine, hyphis tenuibus dense contextum; asci cylindrici, 85 $\times$ 12 μ; ascosporae octonae, ellipsoideae, brunneae, 4-loculares, protoplastis rotundatis, apicalibus minoribus, 17–19 $\times$ 5–6 μ.

Thallus epiphloeodal, olive buff, about 65 μ thick; cortex 55 μ thick, gelified, of very slender periclinal hyphae; algal layer compact, 10 μ thick, of *Trentepohlia* cells, which occasionally penetrate deeply into the bark; medulla not differentiated but hyphae penetrate deeply and disorganize the bark cells. Stromata 0.6–0.7 mm. in diamater, 0.2 mm. tall, lenticular, carbonaceous, covered by the thallus which finally cracks off along with the upper half of the stroma, exposing cup-shaped depressions as seen in some species of *Pyrenula;* perithecia solitary or mostly in

pairs, necks short, emptying into a common ostiole, ellipsoidal with the long axis parallel to the substrate, up to 100 μ in diameter and 180 μ long; parathecium carbonaceous, entire, usually concrescent with the stroma, rarely cracking apart; hypothecium 20 μ thick, of densely woven, slender hyphae; asci cylindric, 8-spored, about 85 $\times$ 12 μ; ascospores ellipsoid, brown, 4-locular, protoplasts rounded, the apical ones finally much smaller than the middle ones, 17–19 $\times$ 5–6 μ.

Sections of a stroma with a solitary perithecium closely resemble those of *Parathelium* with a short, lateral neck, whence the name. Old material, after the upper portion of the stroma has cracked off, might be mistaken for an old thallus of *Pyrenula*.

Cypheliaceae

Thallus crustose, uniform or effigurate, ecorticate, with protococcoid or *Trentepohlia* algae; mazedia sessile or immersed in subcylindric thalline warts, with or without a parathecium.

1. Thallus with protococcoid algae 2
1. Thallus with *Trentepohlia* 4
   2. Ascospores unicellular 3
   2. Ascospores 2–4-locular ..... *Cyphelium* Ach.
3. Mazedia lecideine; ascospores hyaline ..... *Farriola* Norm.
3. Mazedia lecanorine; ascospores finally brown ..... *Carlosia* Samp.
   4. Asci polysporous ..... *Tylophorella* Vainio
   4. Asci 8-spored 5
5. Mazedium with only parathecium, ascospores 2–4-locular ..... *Pyrgillus* Nyl.
5. Mazedium with both parathecium and amphithecium; ascospores mostly 2-locular ..... *Tylophoron* Nyl.
5. Mazedium with both parathecium and amphithecium; ascospores 4-locular, 2-locellate ..... *Schistophoron* Stirton

TYLOPHORON

Tylophoron Nyl., Bot. Zeit. 20:279. 1862.

Type: not designated, based on *T. protrudens* Nyl. and *T. moderatum* Nyl.

Thallus crustose or disappearing; with *Trentepohlia* algae. Mazedium immersed in a subspherical thalline wart at first, then sessile, subcylindric with an open disc; both parathecium and ampithecium present; hypothecium hyaline or brownish; asci cylindric, 8-spored; ascospores 2-(rarely 3-)locular, subspherical to ellipsoid or subfusiform with a thick epispore; spermogonia immersed in the thallus with a hyaline wall; spermatiophores cylindric, slightly branched; spermatia acicular, straight.

Ascospores 8 $\times$ 4 μ; mazedia 0.6–1 mm. in diameter, 0.2–0.4 mm. tall; Mozambique ..... *T. ascidioides* Vainio
Ascospores 9–11 $\times$ 5–7 μ; mazedia 0.2–0.3 mm. in diameter; Usambara ..... *T. moderatum* v. *modestius* Zahlbr.

Tylophoron ascidioides Vainio, Bol. Soc. Broter. II, 6:173. 1929.

Type: Mozambique, Ponta Vermelha, lignicole, Pires de Lima 25.

Thallus epiphloeodal, white (slightly greenish when moist), homoeomerous, 40–50 μ thick, of disorganized filaments of *Trentepohlia*, with very slender hyaline hyphae, a few filaments of *Trentepohlia* penetrating between layers of bark cells.

Mazedium cylindric or constricted at the base, about 0.5 mm. in diameter, 0.7 mm. tall, disc urceolate at first, becoming slightly convex at maturity; amphithecium about 180 μ thick, of slender, densely woven hyphae containing large crystals, but no algal cells seen; parathecium slightly developed; hypothecium of slender vertical hyphae, slightly brownish, 250 μ tall; thecium 120 μ tall; asci cylindric to clavate, 8-spored; paraphyses slender, forming the capillitium; ascospores monostichous, brown, nearly cylindric, 2-locular, sometimes slightly constricted at the septum, wall relatively thick, 8–11 $\times$ 4 μ.

Our specimen has smaller mazedia and slightly longer spores than in the type, but we have preferred to refer it here in the absence of more specimens to show the amount of variability to be expected in the genus.

Nigeria: Ondo Province, Owena near Akure, on *Theobroma*, C. A. Thorold 168.

Cryptotheciaceae

Thallus crustose, epiphloeodal, of very loosely woven hyphae, a true cortex not developed, but the algal layer covered by a layer of hyphae, somewhat more densely woven than those of the medulla; algae *Trentepohlia;* asci 1–8-spored, borne singly throughout the thallus usually in the medulla, rarely in the algal layer, bitunicate and pushing up to the surface for spore discharge; ascospores septate to muriform.

The thallus resembles that of a sterile *Crocynia* or of *Chiodecton* subg. *Byssophorum*, and it is possible that some species referred to these genera may be found to belong in this family. In some species, the brownish tips of the resting asci may be seen at the surface under relatively high magnifications.

Santesson (Foliicolous Lichens I. Symb. Bot. Upsal. 12:1:57–68. 1952) transferred the family to the Arthoniaceae and included a group of species from *Arthonia* and *Arthothelium* in *Stirtonia* and *Cryptothecia* respectively. In this group, the asci are borne in groups in a sort of primitive (?) ardella, without clearly developed paraphyses, often showing a disc at the surface of a slightly different color (fertile areas) from that of the rest of the thallus. While we cannot be certain until we have more data of their development, it is probable that they should be segregated as different genera. For completeness I have included species of this group in the keys. Miss A. L. Smith mentions a thin, hyaline or slightly brownish peridium about each ascus, but I have found no such differentiation in the numerous specimens I have studied. Apparently, the expanding ascus pushes aside the medullary hyphae, so that they are more compact about the asci. The "paraphyses" of some descriptions are only the medullary hyphae between the asci, and are neither true paraphyses nor paraphysoids.

Ascospores bilocular, small ..... *Stirtoniopsis* Groenh.
Ascospores septate, 8–14-locular ..... *Stirtonia* A. L. Smith
Ascospores muriform ..... *Cryptothecia* Stirton

CRYPTOTHECIA

Cryptothecia Stirton, Proc. Phil. Soc. Glasgow 10:164. 1876.

Myriostigma Krmplh., Lich. Foliic. quos legit O. Beccari annis 1866–1867 in insula Borneo, 22. 1874; Nuovo Giorn. Bot. Ital. 7:44. 1875.

Myxotheca Ferd. & Winge, Bot. Tidsskr. 30:212. 1910.

Type: *C. subnidulans* Stirton. *Myriostigma* was based on M. *candidum* Krmplh. Although *Myriostigma* antedates *Cryptothecia,* Santesson has proposed the latter as a *nomen conservandum. Myxotheca* was based on M. *hypocreoides* Ferd. & Winge.

Thallus spreading, smooth or minutely furfuraceous, whitish to pale glaucous, margins sometimes fimbriate; cortex scarcely differentiated, intricate, slightly more compact than the medulla; algal layer of *Trentepohlia* filaments, more or less disorganized; medulla relatively thick, loosely woven, of slender hyphae; asci widely scattered throughout the medulla, rarely in the algal layer, pyriform to subspherical, thick-walled when young, 1–8-spored; ascospores hyaline, muriform, ellipsoid to subspherical.

1. Ascospores small, 20–38 × 8–14 μ, asci 4-spored 2
1. Ascospores much larger 3
   2. Thallus lacerate in long, irregular lobes, pseudo-ardella with a pale flesh-colored disc; ascospores 20–38 × 8–14 μ; foliicole; Angola ..... *Arthothelium laceratum* (Vain.) Zahlbr.
   2. Thallus continuous; asci very scattered, no disc present; ascospores 28 × 14 μ; corticole; Nigeria ..... *C. nigeriensis* Dodge
3. Asci monosporous, rarely 2-spored 4
3. Asci 8-spored 5
   4. Ascospores 50–75 × 20–32 μ; Cameroons ..... *C. subnidulans* Stirton
   4. Ascospores 40 × 35 μ; Nigeria ..... *C. Thoroldi* Dodge
5. Ascospores 20-locular, 4–5-locellate, 70–125 × 25–30 μ, sharply bent; Usambara ..... *C. geniflexum* (Müll. Arg.) Sant.
5. Ascospores 12–14-locular, 4–6-locellate, 70–95 × 25–35 μ, curved but not sharply bent; Usambara ..... *Arthothelium dictyophorum* Müll. Arg.
5. Ascospores about 10-locular, 4–6-locellate 6
   6. Ascospores 70–100 × 25–50 μ; Cameroons ..... *C. Stirtoni* A. L. Smith
   6. Ascospores 60–80 × 25–35 μ; Usambara ..... *C. caesioalba* (Müll. Arg.) Sant.

Cryptothecia **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Ina near Ibadan, on *Theobroma,* C. A. Thorold 151a.

Thallus subarachnoideus, pallide griseus, epiphloeodes, 50–200 μ crassitudine, superficie inaequali; ecorticatus; stratum algarum 25–40 μ crassitudine, filamentis verticalibus *Trentepohliae,* cellulis 5–6 μ diametro, cylindricis vel subsphaericis; medulla hyphis tenuibus, 1 μ diametro, granulis inspersis, laxe intertextis; asci solitarii in medulla sparsi, subsphaerici, 40 μ diametro, pachydermei; ascosporae quaternae, hyalinae, ellipsoideae, murales, ca. 28 × 14 μ.

Thallus subarachnoid, light mineral gray, epiphloeodal, 50–200 μ thick, surface irregular; ecorticate; algal layer 25–40 μ, of more or less vertical filaments of *Trentepohlia* 5–6 μ in diameter, cells cylindric to subspheric; medulla of loosely woven hyphae about 1 μ in diameter, more or less inspersed with minute granules; asci borne singly in the medulla, subspherical, about 40 μ in diameter, very thick-walled, 4-spored; ascospores hyaline, ellipsoidal, muriform, about 28 × 14 μ.

CRYPTOTHECIA **Thoroldi** Dodge, sp. nov.

Type: Nigeria, Ondo Province, Owena near Akure, on *Theobroma*, C. A. Thorold 163.

Thallus epiphloeodes, 135 μ crassitudine, byssoideus, pallide griseus, margine albo, byssoideo; pseudocortex 25 μ crassitudine, hyphis erectis 2–3 μ diametro, laxe intertextis; stratum algarum 15–25 μ crassitudine, filamentis *Trentepohliae*, plus minusve periclinalibus, 4 μ diametro; medulla 85 μ crassitudine, hyphis tenuibus laxe intertextis; asci solitarii, in strato algarum sparsi, pyriformes vel subsphaerici, 43 $\times$ 27–35 μ, juventute pachydermei, monospori; ascosporae hyalinae, muriformes, 40 $\times$ 26–34 μ.

Thallus epiphloeodal, 135 μ thick, byssoid, spongy, light mineral gray with a white byssoid margin; pseudocortex 25 μ thick, of erect hyphae 2–3 μ in diameter, forming a velvety surface; algal layer 15–25 μ thick, of more or less periclinal filaments of *Trentepohlia* about 4 μ in diameter; medulla 85 μ thick, of very slender, loosely woven, hyaline hyphae; asci monosporous, borne singly in the algal layer, pyriform to subspheric, 43 $\times$ 27–35 μ, thick-walled when young; ascospores hyaline, muriform, 40 $\times$ 26–34 μ.

ARTHONIACEAE

Thallus crustose, uniform, homeo- or heteromerous, epi- or endophloeodal, ecorticate, with *Palmella*, *Trentepohlia* or *Phyllactidium* algae; ardella without parathecium, variable in shape from rounded, elongate, or radially branched, usually single (in a stroma in *Synarthonia*); paraphyses branched and anastomosing to form a thick epithecium; asci subspheric to broadly pyriform; ascospores septate or muriform.

1. Ardellae immersed in a stroma; ascospores becoming brown; algae *Trentepohlia* ..... *Synarthonia* Müll. Arg.
1. Ardellae solitary 2
   2. Algae *Trentepohlia* 3
   2. Algae *Palmella* 4
   2. Algae *Phyllactidium*; foliicole ..... *Arthonia* Ach.
3. Ascospores septate ..... *Arthothelium* Mass.
3. Ascospores muriform ..... *Allarthonia* Nyl.
   4. Ascospores septate ..... *Allarthothelium* Zahlbr.
   4. Ascospores muriform ..... *Arthoniopsis* Müll. Arg.
5. Ascospores septate, hyaline ..... *Trichophyma* Rehm
5. Ascospores muriform 6

ARTHONIA

ARTHONIA Ach., Neues Jour. f. d. Bot. 1:3:3. 1806.

Ustalia Fr., Syst. Orb. Veg. 274. 1825.

Type: not designated; eight species included in the original treatment. The foliose species are now placed in *Solorina*. Of the six remaining, all belong in *Arthonia* as now recognized. *Opegrapha radiata* Pers. may be selected as the type. *Ustalia* Fr. was based on *Graphis caribaea* Ach. For a discussion of the numerous

other possible synonyms and their types, see Santesson, Foliicolous Lichens I. Symb. Bot. Upsal. 12:1:68–75. 1952.

Thallus crustose, uniform or subeffigurate, epi- or endophloeodal, or saxicolous; ecorticate or with a pseudocortex of disintegrated bark cells; algae *Trentepohlia;* medulla often scarcely developed; ardellae rounded, elongate or star-shaped, more or less immersed in the thallus; parathecium absent or the outermost paraphyses blackened forming a pseudoparathecium; paraphyses branched and anastomosing above, forming a thick epithecium; asci subspheric, pyriform, rarely ellipsoid, thick-walled when young, especially above, 8-spored; ascospores oblong-ellipsoid to clavate when the apical cell is much larger than the others, septate, 2– pluri-locular, hyaline or brownish; spermogonia superficial, wall dark, spermatiophores subcylindric; spermatia cylindric, straight or curved. Stylospores sometimes present, terminal, ovoid to ellipsoid, unicellular or septate, hyaline or brownish.

1. Ardella white or very pale 2
1. Ardella bright red to violet 3
1. Ardella dark fuscous to black 7
   2. Disc white, more or less confluent like a minute pertusarial stroma (belongs in *Stirtonia,* fide Sant.); ascospores 8–10-locular, 50–60 × 20–22 μ; Usambara..... *A. pertusariella* Müll. Arg.
   2. Disc pale flesh-color, circular or angular (belongs in *Stirtonia,* fide Sant.); ascospores 10–locular, 38–46 × 10–16 μ; Usambara..... *A. carneoalbens* Müll. Arg.
   2. Disc densely white-pruinose, pale brown below the pruina, 0.2 mm. in diameter; ascospores 4–6-locular, 18–22 × 5.5–6 μ; Sierra Leone..... *A. subcaesia* Dodge
   2. Disc yellowish white, lobulate or angular; ascospores 6–7-locular, 17–20 × 5–5.5 μ; Angola ..... *A. loangana* Müll. Arg.
3. Disc red, ascospores 2-locular, 15–20 × 6–7 μ; Mozambique..... 4
3. Disc cinnabar to violet 5
3. Disc rufescent, subpruinose; ascospores 6-locular, 30–32 × 10 μ; Mozambique..... *A. leptographoidea* (Vainio) Zahlbr.
   4. Thallus white ..... *A. erythrocarpa* Vainio
   4. Thallus pale rose, or rose spotted on white..... *A. erythrocarpa* v. *roseopallens* Vainio
5. Ardella round, disc caesio-pruinose, margin black; Mozambique..... *A. cinnabarina* v. *orbicella* Nyl.
5. Ardella oblong, disc red-pruinose, margin black; ascospores 17–22 × 5–6 μ; Angola ..... *A. cinnabarina* v. *rimata* (Vainio) Zahlbr.
5. Ardella long and narrow, disc blackish, margin red; ascospores 16–20 × 3–5 μ; Angola ..... *A. cinnabarina* v. *reducta* (Vainio) Zahlbr.
5. Ardella asteroid-branched 6
   6. Disc pruinose, then nude and darkening; Kenya..... *A. cinnabarina* v. *elegantula* Zahlbr.
   6. Disc cinnabar purple; ascospores 20 × 8 μ; Usambara..... *A. cinnabarina* v. *speciosa* Müll. Arg.
   6. Disc fuscous, pruinose; ascospores 16–18 × 3–5 μ; Angola..... *A. cinnabarina* v. *medusaeformis* (Vainio) Zahlbr.
   6. Disc violet, ardella covering an area 4–5 mm., very dendroid-branched; ascospores 17–22 × 5–6 μ; Angola..... *A. cinnabarina* v. *dendritica* Steiner
7. Ascospores 3–4-locular 8
7. Ascospores 4–5-locular, 14–18 × 5–6 μ; ardella elliptic, 0.2 mm. wide, disc red-fuscous when moist, black when dry, not pruinose; Somaliland..... *A. somaliensis* Müll. Arg.
7. Ascospores 5-locular, 16–23 × 7.5–9 μ, fuscous; ardella dendroid-branched, branches up to 3 mm. long, disc dark violet when dry, not pruinose; Socotra..... *A. gregaria* v. *dendritica* Steiner
7. Ascospores 5–6-locular 9
7. Ascospores 7–12-locular 10
   8. Ardella round, 0.4–0.5 (–0.7) mm. in diameter; ascospores 17–20 × 6 μ, with halo, 4-locular; Sierra Leone ..... *A. modesta* Dodge
   8. Ardella round, 0.5–1 mm.; ascospores 10–12 × 4–5 μ, 4-locular; Socotra..... *A. applanata* Stzbgr.
   8. Ardella elliptic to oblong, 0.3–0.5 × 0.1–0.2 mm., or round, 0.2–0.3 mm. in diameter; ascospores 12–16 × 3–4.5 μ, mostly 3-locular; Mozambique..... *A. palmensis* (Vainio) Zahlbr.

9. Ascospores 18–20 × 4–5 μ; ardella 0.5 × 1 mm., disc black; Sierra Leone.....*A. elevata* Dodge
9. Ascospores 28 × 11–12 μ; ardella 0.5–0.8 × 0.12–0.15 mm., disc fuscous black; Angola .....*A. leptogramma* Müll. Arg.
9. Ascospores 30–32 × 10 μ; ardella 0.2–0.5 × 0.1–0.15 mm., disc rufescent; Mozambique .....*A. leptographoidea* (Vainio) Zahlbr.
10. Ascospores 22–30 × 8–9.5 μ; ardella 0.5 × 0.25 mm.; Kenya.....*A. ilicinodes* Steiner
10. Ascospores 24 × 8–9 μ; ardella 0.5–1 × 0.1–0.5 mm.; Mozambique..... .....*A. microcarpella* (Vainio) Zahlbr.
10. Ascospores 24–27 × 10.5–13.5 μ, 8-locular; ardella round, 0.5 mm. in diameter; Sierra Leone .....*A. leptogrammodes* Dodge
10. Ascospores 50–60 × 18–20 μ, 10–12-locular; ardella round, 0.5–1 mm. in diameter; Socotra .....*A. calospora* Müll. Arg.

ARTHONIA **modesta** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Peltophorum africanum* v. *speciosum*, F. C. Deighton M4342.

Thallus endophloeodes, superficie fumoso-griseus; pseudocortex ad 25 μ crassitudine, cellulis suberosis decompositis et hyphis tenuibus hyalinis; stratum algarum ad 20 μ crassitudine, filamentis periclinalibus *Trentepohliae* inter cellulas suberosas decompositas. Ardella orbicularis, modice convexa, 0.4–0.5(–0.7) mm. diametro, disco nigro; hypothecium non bene evolutum; thecium 80 μ altitudine; paraphyses tenues, superne ramosae anastomosantesque, epithecium brunneum, ca. 20 μ crassitudine super ascos formantes; asci ellipsoidei vel subpyriformes, 30 × 20 μ, apicibus incrassatis; ascosporae octonae, hyalinae, halone circumdatae, (3-)4-loculares, late clavatae, cellula apicali majore, 17–20 × 6 μ.

Thallus pale smoke gray to smoke gray; endophloeodal; pseudocortex up to 25 μ thick, of disintegrated bark cells and very slender, hyaline hyphae; algal layer up to 20 μ thick, of periclinal filaments of *Trentepohlia* in and between disintegrated bark cells, with a few medullary hyphae penetrating more deeply into the bark. Ardella circular, 0.4–0.5(–0.7) mm. in diameter, moderately convex, disc black; hypothecium not differentiated, the asci and paraphyses appearing to arise from disintegrated bark cells; thecium 80 μ tall in the center, slightly lower toward the margin; paraphyses, slender, branched and anastomosing above the asci, forming a brownish epithecium about 20 μ thick; asci ellipsoid to subpyriform, 8-spored, about 30 × 20 μ, tip thickened, protoplast broadly mamillate; ascospores hyaline, broadly clavate, with a thin halo, 3–4-locular, terminal cell somewhat larger, 17–20 × 6 μ.

ARTHONIA **elevata** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Anisophyllea laurina*, F. C. Deighton M4406.

Thallus endophloeodes, albidus, pruinosus; pseudocortex 25 μ crassitudine, cellulis suberosis decompositis et hyphis hyalinis tenuissimis; stratum algarum 50 μ crassitudine, filamentis verticalibus *Trentepohliae* et cellulis suberosis decompositis. Ardella ad 1 mm. diametro, orbicularis vel oblonga (dein 0.5 × 1 mm.), disco nigro, pseudolecideina; pseudoparathecium paraphysibus nigricantibus; thecium 65 μ altitudine; hypothecium 10 μ crassitudine hyphis periclinalibus pallide brunneis; asci pyriformes vel subsphaerici, pachydermei, 32 × 25 μ; ascosporae

octonae, fasciculatim dispositae, clavatae, hyalinae, 5–6-loculares, 18–20 × 5–6 μ.

Thallus endophloeodal, nearly white, pruinose, subrimose on very rimose bark; pseudocortex about 25 μ thick, of disintegrated bark cells and very slender hyphae; algal layer about 50 μ thick, of short, vertical, partly disorganized filaments of *Trentepohlia* and some disintegrated bark cells; medulla not differentiated but medullar hyphae penetrating some distance into the bark and disorganizing the cells. Ardella round, up to 1 mm. in diameter or oblong, then about 0.5 × 1 mm., disc black, convex, seated on bark cells less disintegrated than in the surrounding thallus, thus appearing elevated and lecideoid (rarely lecanoroid); pseudoparathecium of blackened paraphyses, progressively paler within; thecium 65 μ tall in the center, somewhat lower toward the margin with younger asci; hypothecium 10 μ thick, of pale brownish periclinal hyphae; asci pyriform to subspheric, 8-spored, 32 × 25 μ when nearly mature, thick-walled; ascospores fascicled, clavate, hyaline, 5–6-locular, 18–20 × 5–6 μ.

ARTHONIA **leptogrammodes** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Lagerstroemia speciosa*, F. C. Deighton M4347.

Thallus epiphloeodes, albidus, tenuissimus, tenuissime nigromarginatus; ecorticatus; filamentis *Trentepohliae*, 5–6 μ diametro, hyphisque tenuissimis, crystallis minutis nubilatis. Ardella orbicularis, 0.5 mm. diametro, rare 2–3-confluentia, disco nigro, immarginata; hypothecium hyalinum, tenue; thecium 55 μ altitudine; paraphyses tenues, ramosae anastomosantesque, superne brunneae; asci pyriformes, 35 × 25 μ, juventute pachydermei protoplastis mamillatis, dein leptodermei; ascosporae octonae, hyalinae, polystichae, halone tenui circumdatae, ad 8-loculares, cellula apicali 9 μ longitudine, basali 6 μ, intermedii 2 μ longitudine, 24–27 × 10.5–13.5 μ.

Thallus epiphoeodal, white, very thin, with a narrow black margin; algae *Trentepohlia*, filaments 5–6 μ in diameter, partly disorganized and surrounded by very slender hyphae covered with minute crystals. Ardella nearly circular, 0.5 mm. in diameter, rarely 2–3 confluent, disc black, immarginate; hypothecium very thin and hyaline; thecium 55 μ tall; paraphyses slender, branched and anastomosing, slightly brownish above; asci pyriform, 8-spored, thick-walled when young, especially above, protoplast mamillate, becoming quite thin-walled at maturity; ascospores hyaline (a few slightly smoky as if finally becoming brown) with a thin halo, up to 8-locular, the apical cell 9 μ, the basal cell 6 μ, the intermediate cells about 2 μ long, 24–27 × 10.5–13.5 μ.

Perhaps closest to *A. leptogramma* Müll. Arg. in size and shape of the ascospores, although both terminal cells are much larger than the middle cells, which is very unusual in the whole genus *Arthonia*. The ardella is completely different in size and shape.

ARTHONIA (PACHNOLEPIA) **subcaesia** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Bauhinia tomentosa*, F. C. Deighton M4307H.

Thallus epiphloeodes, tenuissimus, albidus, tenuiter nigro-marginatus, cellulis cylindricis *Trentepohliae* et hyphis tenuissimis, superne crystallis minutis nubilatis. Ardella orbicularis vel suboblonga, erumpens, disco dense caesio-pruinoso, 0.2 mm. diametro; hypothecium 50 μ crassitudine, pallide brunneum, hyphis tenuibus cum crystallis; thecium 50 μ altitudine; paraphyses tenues, ramosae anastomosantesque; asci pyriformes, 35–40 $\times$ 18–20 μ, juventute pachydermei; ascosporae octonae, polystichae, clavatae, hyalinae, 4–6-loculares, 18–22 $\times$ 5.5–6 μ.

Thallus epiphloeodal, very thin, white to pearl gray with a narrow black margin, nearly homoeomerous; algal cells of *Trentepohlia*, cylindric, from disorganized filaments, surrounded by very slender, tangled hyphae, the outer portions covered by minute crystals. Ardella round to slightly oblong, erumpent, disc densely white-pruinose (pale brownish when the pruina is rubbed off), about 0.2 mm. in diameter; parathecium not differentiated; hypothecium about 50 μ thick, pale brownish, of slender hyphae covered with crystals; thecium 50 μ tall; paraphyses slender, branched and anastomosing to form the epithecium above the asci; asci 8-spored, pyriform, 35–40 $\times$ 18–20 μ, very thick-walled, especially above, when young; ascospores polystichous, clavate, hyaline, 4–6-locular, 18–22 $\times$ 5.5–6 μ.

OPEGRAPHACEAE

Thallus crustose, cortex poorly developed or absent, algae *Palmella* (Xylographeae), *Trentepohlia* (Opegrapheae), or *Phyllactidium* (Micrographeae); medulla poorly developed or absent. Lirellae simple or branched, usually sessile, rarely immersed, single (with two parallel thecia per lirella in *Ptychographa* and *Diplogramma*); parathecium usually thick, black, and carbonaceous (rudimentary in *Gymnographa*); ascus more or less clavate with 8 or less ascospores; ascospores unicellular, septate, or muriform, walls and septa thin, protoplasts cylindric in septate spores, appearing cubical in muriform spores.

1. Algae *Palmella* (Xylographeae) 2
1. Algae *Trentepohlia*, ascospores septate or muriform (Opegrapheae) 6
1. Algae *Phyllactidium* (Micrographeae) 9
2. Ascospores unicellular 3
2. Ascospores septate 5
2. Ascospores muriform ..... *Aulaxina* Fée
3. Lirellae with a single thecium each 4
3. Lirellae with two parallel thecia each ..... *Ptychographa* Nyl.
4. Hypothecium pale; on wood, rarely on bark ..... *Xylographa* Fr.
4. Hypothecium dark; saxicolous ..... *Lithographa* Nyl.
5. Ascospores bilocular, lirellae caespitose ..... *Encephalographa* Mass.
5. Ascospores 4-locular, 2 parallel thecia per lirella ..... *Diplogramma* Müll. Arg.
6. Ascospores hyaline 7
6. Ascospores finally brown 8
7. Ascospores septate ..... *Opegrapha* Pers.
7. Ascospores muriform ..... *Helminthocarpon* Fée
8. Lirellae immersed; parathecium rudimentary ..... *Gymnographa* Müll. Arg.
8. Lirellae sessile; parathecium well developed ..... *Sclerographis* Zahlbr.
9. Ascospores hyaline ..... *Fouragea* Trev.
9. Ascospores brown ..... *Micrographa* Müll. Arg.

OPEGRAPHA

Opegrapha Pers., Neue Ann. Bot. [Usteri] 1:23, 29–32. 1794, *non* Humb., Fl. Friberg. Specim. 57. 1793.

Alyxoria S. Gray, Nat. Arr. Brit. Pl. 1:101. 1821.
Hysterina S. Gray, Nat. Arr. Brit. Pl. 1:504. 1821.
Scaphis Eschw., Syst. Lich. 14. 1824.
Oxystoma Eschw., Syst. Lich. 14. 1824.
Zwackhia Koerb., Syst. Lich. Germ. 284. 1854.
Xylastra Mass., Framm. Lich. 10. 1855.

Type: *Opegrapha* Humb. was based on *Lichen scriptus* L. and its varieties, which species has been the type of *Graphis* since that genus was founded. However, *Opegrapha* Pers. 1794 has been universally recognized in the present sense since its publication and being based wholly on species now included in the genus, it should be conserved against *Opegrapha* Humb. 1793; otherwise all the species now in *Graphis* would have to be transferred to *Opegrapha* and all those now in *Opegrapha* would have to be transferred to *Alyxoria* or *Hysterina*. In his generic description, Persoon cites *Lichen scriptus* var. a. *L. rugosus* L., Hoffm., which later in the discussion of the species he cites as a synonym of his *O. faginea*. This entity is now considered a fungus; hence in selecting a type from the other 13 species, it would be better to select another species, such as *O. lichenoides* Pers. to conserve the genus in its present sense.

Alyxoria Ach. in S. Gray was based on *Opegrapha notha* Ach. and *O. diaphora* Ach. *Hysterina* S. Gray was based on 12 species still included in *Opegrapha*. *Scaphis* Eschw. was based on *O. notha* Ach. (figured) and on *S. anfractuosa* Eschw. and *S. compressa* Eschw. *Oxystoma* Eschw. was based on *O. cylindrica* Raddi. *Zwackhia* Koerb. was based on *Z. involuta* (Wallr.) Koerb. *Xylastra* Mass. was based on *Arthonia fuscescens* Fée.

Thallus crustose, uniform, ecorticate or nearly so, either saxicole or corticole; algae *Trentepohlia;* lirellae immersed to sessile, lips somewhat connivent, nearly closed to open, especially when wet; parathecium entire or dimidiate (in sect. *Pleurothecium*); paraphyses branched and anastomosing above the asci; asci clavate, 8-spored; ascospores ellipsoid to fusiform, straight or slightly curved, hyaline, septate, 2–18-locular, protoplasts cylindric; spermatia exobasidial, filiform, straight or curved. Stylospores sometimes present, terminal, ovoid to long-ellipsoid, straight or slightly curved, hyaline.

In the following key, the species are corticole unless otherwise stated:

1. Perithecium entire (Euopegrapha) 2
1. Perithecium dimidiate (Pleurothecium) 14
2. Ascospores 4-locular 3
2. Ascospores 4–9-locular 8
2. Ascospores 10–14-locular 13
3. Thallus and disc ochraceo-pruinose; lirellae 0.3–2 × 0.25–0.3 mm., simple or rarely forked; ascospores 14 × 4 μ, without halo; Angola ..... *O. Vainioi* Zahlbr.
3. Thallus and disc not pruinose 4

4. Ascospores more than 18 μ long; thallus white 5
4. Ascospores less than 18 μ long 6
5. Lirellae sessile, 0.3–0.5 × 0.2 mm.; ascospores 35–40 μ long; São Thomé.....*O. subnothella* Nyl.
5. Lirellae semi-immersed, 0.2–0.8 × 0.2–0.3 mm.; ascospores 18–23 × 3–4 μ; Angola .....*O. albocinerea* Vainio
6. Thallus white 7
6. Thallus yellowish green; ascospores 13–15 × 4–5 μ, with halo; lirellae 1.5–1.7 × 0.2–0.8 mm.; Boroma on Zambesi River.....*O. Menyhartii* Müll. Arg.
6. Thallus pale clay color, subfarinose; ascospores 16 × 6 μ; lirellae 1.5–2.5 × 0.5 mm.; Socotra .....*O. sororiella* Müll. Arg.
7. Thallus chalky white; saxicole; ascospores 16–18 × 4 μ; Senegal.....*O. alboatra* Nyl.
7. Thallus whitish-granulate; corticole; ascospores 14–15 × 4.5 μ; São Thomé.....*O. lepidella* Nyl.
7. Thallus white, thin; corticole; ascospores 13–15 × 3–3.5 μ; Ascension Island..... .....*O. aterula* Müll. Arg.
8. Ascospores more than 27 μ long; thallus ashy to glaucescent..... 9
8. Ascospores less than 27 μ long 10
9. Ascospores 26–30 × 6–6.5 μ, 6–8-locular, cells subequal, no halo; thallus ashy; lirellae 0.2–0.5 × 0.1 mm.; Kenya.....*O. viridulata* Steiner
9. Ascospores 30–34 × 4–5 μ, 8–10-locular, cells subequal; lirellae angular or reniform; calcicole; Socotra .....*O. cretacea* Müll. Arg.
9. Ascospores 32–45 × 5–6 μ, with halo, 6–8-locular, one or two middle cells much longer than the others; thallus pale glaucescent; lirellae 0.3–1 × 0.15–0.25 mm.; Angola .....*O. septemseptata* Vainio
9. Ascospores 27.5–40 × 4–5 μ, without halo, 7–9-locular; thallus ashy to glaucescent; lirellae 0.2–0.7 × 0.1 mm.; Mozambique.....*O. delicata* Vainio
10. Thallus pale or ashy 11
10. Thallus pale yellowish or glaucous 12
10. Thallus fusco-virescent; ascospores 16–21 × 5–6 μ, 4–8-locular; lirellae straight; Ilha Principe .....*O. leptographa* Nyl.
11. Ascospores 20 × 4.5 μ, 6-locular; thallus ashy; lirellae rounded, 0.4–0.5 mm. in diameter, or elongate, 0.8–1.5 × 0.4–0.5 mm.; base of parathecium thinner than the sides; Usambara .....*O. rufa* Müll. Arg.
11. Ascospores 20–25 × 4–5 μ, 8–9-locular; thallus pale; lirellae (0.5)–3 × 0.3–0.5 mm., straight or flexuous; Mozambique.....*O. vermelhana* Vainio
11. Ascospores 15–19 × 4–5 μ, 6-locular; thallus white; Angola.....*O. loandensis* Vainio
11. Ascospores 15 × 4 μ, 4–5-locular; thallus white; lirellae long, 0.2 mm. wide, flexuous; Socotra .....*O. Dracaenarum* Müll. Arg.
11. Ascospores 20–28 × 6–7 μ, 8-locular; lirellae simple or with lateral branch, 1–1.5 mm. long; lignicole; Socotra.....*O. vestita* Müll. Arg.
11. Ascospores 18–27 × 4 μ, 8–9-locular; lirellae simple or branched, 1–1.5 × 0.2–0.25 mm.; lignicole; Socotra .....*O. elegans* Müll. Arg.
11. Ascospores 20–25 × 5 μ, 4–6-locular; lirellae immersed, simple or branched, 0.5 mm. broad; calcicole; Socotra .....*O. subcalcarea* Müll. Arg.
12. Ascospores 19–21 × 3–4 μ, 4–6-locular; thallus pale yellowish-glaucous; lirellae radially branched, immersed; Nigeria.....*O. nigeriensis* Dodge
12. Ascospores 11–13 (–15) × 3–3.5 μ, 4–6-locular; thallus pale yellow, rimulose, finally cracking away; lirella 2 × 0.25 mm.; Socotra.....*O. microspora* Müll. Arg.
13. Ascospores 47–57 × 7–9 μ, 12–14-locular; lirellae simple, 1–2.2 mm. long; Sierra Leone .....*O. prosodea* Ach.
13. Ascospores 30–46 × 5–8 μ, 8–10-locular; lirellae 2–3 × 0.2 mm.; Angola....*O. graphidiza* Nyl.
14. Ascospores 6-locular 15
14. Ascospores 8–14-locular 16
15. Ascospores 15–19 × 4–5 μ, apical cells larger; lirellae 1–3 × 0.3–0.4 mm.; thallus white; Angola .....*O. loandensis* Nyl. sec. Vainio
15. Ascospores 22 × 6–7 μ, apical cells larger; lirellae 1–1.5 × 0.2–0.3 mm.; simple or 2–3-forked; thallus pale greenish; Sierra Leone.....*O. humilis* Müll. Arg.
15. Ascospores 23–35 × 3.5 μ; lirellae radiately branched; thallus white; Mozambique .....*O. medusulina* Nyl.
16. Thallus olive to glaucous; ascospores 30–56 × 6–8 μ, with halo, 9–14-locular; lirellae 0.3–1 × 0.2 mm., simple, straight or curved; Angola.....*O. prosodeoides* Vainio

16. Thallus white or pale glaucous 17
17. Lirellae radially branched, 5 × 0.2–0.3 mm.; ascospores 9-locular, 32 × 3 μ; Mozambique ..... *O. mozambica* Vainio
17. Lirellae simple or forked 18
18. Ascospores 32–37 × 3–4 μ, 8–9-locular; lirellae white, 0.3–2.5 × 0.2–0.4 mm., K—; Mozambique ..... *O. frustulosa* Vainio
18. Ascospores 30–46 × 5–8 μ, 8–10-locular; lirellae 2–3 × 0.2 mm., straight or flexuous; Angola ..... *O. graphidiza* Nyl.
18. Ascospores 27–40 × 5–6 μ, 9–12-locular; lirellae 1–4 × 0.25 mm., simple or forked; thallus pale glaucous to white, K orange; Tanganyika..... *O. subgraphidiza* Zahlbr.

OPEGRAPHA **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Ondo Province, Owena near Akure, on *Theobroma*, C. A. Thorold 164.

Thallus pallide flavo-glaucus, subpruinosus, margine albo-byssino, angusto, 240 μ crassitudine; cortex vix evolutus; stratum algarum 50 μ crassitudine, cellulis cylindricis *Trentepohliae* isodiametricis; medulla 190 μ crassitudine, duobus stratis sistens, superum 135 μ crassitudine hyphis tenuibus hyalinis laxe intertextis, inferum 55 μ crassitudine hyphis periclinalibus dense contextum. Lirellae radiato-ramosae, ad 1.5 mm. diametro, thallo immersae vel usque ad 30 μ super thallum emergentes; parathecium integrum, 80 μ altitudine, carbonaceum, labiis conniventibus; hypothecium vix evolutum; thecium rotundatum, 40 μ altitudine; paraphyses tenues, ramosae anastomosantesque, epithecium obscure brunneum 8–10 μ crassitudine formantes; asci ellipsoidei, 24 × 8 μ, leptodermei; ascosporae octonae, hyalinae, 4–6-loculares, cellulis cylindricis, 19–21 × 3–4 μ.

Thallus pale yellowish-glaucous, subpruinose, with a very narrow white byssine margin, about 240 μ thick; cortex scarcely differentiated, consisting of very slender hyphae with minute crystals extending a few micra above the algal cells; algal layer about 50 μ thick, of *Trentepohlia* cells closely packed, cylindric, nearly isodiametric, with scattered cells deeper in the medulla; medulla 190 μ thick, in two layers, the upper about 135 μ thick, of slender, hyaline hyphae, very loosely woven, the lower about 55 μ thick, of compactly woven periclinal hyphae, slightly brownish next the substratum. Lirellae radiately branched groups about 1.5 mm. in diameter, immersed in the thallus or protruding about 30 μ above the surface of the thallus; parathecium entire, 80 μ tall, 40 μ thick, carbonaceous, lips connivent; hypothecium scarcely differentiated; thecium 40 μ tall, rounded; paraphyses slender, branched and anastomosing, forming a dark brown epithecium 8–10 μ thick; asci 8-spored, ellipsoid, about 24 × 8 μ, wall thin, only slightly thickened at the tip when young; ascospores hyaline, 4–6-locular, wall rather thick but protoplasts cylindric, 19–21 × 3–4 μ.

The texture and the color of the thallus resemble those of *Chiodecton* at first sight, while the radially branched lirellae suggest a *Phaeographis*. The lirellae are distinct, without thickened and coalescent bases as in the Chiodectonaceae. They are immersed in the algal layer and the upper part of the loose medulla, not reaching the substrate as in the Graphidaceae and most other Opegraphaceae.

OPEGRAPHA PROSODEA Ach., Meth. Lich. 22. 1803.

Type: Sierra Leone, corticole, Afzelius.

Thallus epiphloeodal, between grape green and vetiver green, minutely verrucose and somewhat rimulose, without a black margin, 35–55 μ thick, almost homoeomerous; algae short vertical filaments of *Trentepohlia,* cells short-cylindric, 5–6 μ in diameter, terminal cells subspheric and slightly larger. Lirellae black, elevated, linear, straight, about 135 μ wide and up to 1.5 mm long, covered by a thin hyaline layer 5–6 μ thick, of decomposed hyphae; parathecium 25–30 μ thick below and on the vertical sides, thinning to 12–15 μ at the somewhat connivent lips, carbonaceous; hypothecium 12–15 μ thick, of slender, deeply staining hyphae; paraphyses slender, somewhat branched, tips clavate, covered by minute brownish crystals, gelifying as the asci mature; asci 8-spored, narrowly ellipsoid, 80 $\times$ 20 μ, thick-walled at first, then thin-walled except at the somewhat thickened tip; ascospores hyaline to slightly brownish when moribund, long-fusiform, 40 $\times$ 5–6 μ, 12–14-locular, walls and septa rather thick, but protoplasts cylindric.

If Nylander (Ann. Sci. Nat. Bot. IV, 11:229. 1859) was reporting the spores of the type ("ex hb."), our spores are somewhat smaller. In other respects our specimens agree well with the Acharian description, although it lacks any fuscous shade in the thallus. *O. graphidiza* Nyl. from Angola differs in a less well-developed thallus and perhaps dimidiate lirellae. Nylander states, "hypothecium fuscescens" in the formal description, using hypothecium in the sense of base of lirella, as he often did, thus implying that the parathecium is entire. He compares it, however, with the dimidiate *Graphis scripta* in the notes at the end of his description, implying that it is dimidiate. Vainio, who presumably studied the type, places it in the section *Pleurothecium* with dimidiate lirellae.

Nigeria: Ina near Ibadan, on *Theobroma,* C. A. Thorold 150.

GRAPHIDACEAE

Thallus crustose, cortex amorphous or absent, epi- or endophloeodal, with *Trentepohlia* algae (*Palmella* in *Xyloschistes*); lirellae usually more or less immersed in the thallus, or, if sessile, the sides covered with thallus until late, roundish, oblong, simple or branched, single; parathecium entire or dimidiate, carbonaceous, colored or hyaline (very rudimentary to practically absent in *Graphina* sect. *Platygrammodes*); paraphyses slender, unbranched, tips thickened and warted in *Acanthographis;* asci clavate when young becoming oblong to cylindric when mature with 8 or fewer ascospores; hypothecium hyaline or pale; ascospores hyaline or brown, septate or muriform, protoplasts rounded to lenticular.

1. Ascospores septate 2
1. Ascospores muriform 5
2. Ascospores hyaline 3
2. Ascospores brown at maturity 4
3. Paraphyses without warted and conspicuously thickened clavate tips ..... *Graphis* Ach.
3. Paraphyses with conspicuously clavate and warted tips ..... *Acanthographis* Wats.
4. Protoplasts of ascospores cylindric; ascospores mostly 2-locular ..... *Melaspilea* Nyl.
4. Protoplasts of ascospores rounded; ascospores 4- or more locular ..... *Phaeographis* Müll. Arg.

5. Ascospores hyaline 6
5. Ascospores brown 7
6. Paraphyses without thickened and warted tips ..... *Graphina* Müll. Arg.
6. Paraphyses with conspicuously clavate and warted tips ..... *Acanthotheciopsis* Zahlbr.
7. Algae *Palmella;* lignicole ..... *Xyloschistes* Vainio
7. Algae *Trentepohlia* ..... *Phaeographina* Müll. Arg.

GRAPHIS

GRAPHIS Adans., Fam. Pl. 2:11. 1763 [uninomial nomenclature]; Ach., K. Vetensk. Akad. Nya Handl. 145. 1809.

Fissurina Fée, Essai Crypt. Ecorces Officin. 59. 1824.
Aulacographa Leight., Ann. Mag. Nat. Hist. II, 13:389. 1854.
Dyplolabia Mass., Neagenea Lich. 6. 1854.
Diplographis Mass., Atti I. R. Inst. Veneto III, 5:273. 1860.
? *Limboria* Trev., Conspect. Verruc. 15. 1860, *non* Ach.
Anomorpha Nyl., Lich. Ins. Guineens. 50. 1889.
Digraphis Clements, Gen. Fung. 59. 1909.

Type: *Lichen scriptus* L. *G. pulverulenta, G. Cerasi, G. betuligna,* and *G. serpentina* were described as new at the same time, all now often considered varieties of *G. scripta* (L.) Ach. *Fissurina* Fée was based on *F. Dumastii* Fée, now placed in *Graphis,* and *F. incrustans* Fée, now in *Graphina* Müll. Arg. *Aulacographa* Leight. was based on *Graphis elegans* Ach. *Dyplolabia* Mass. was based on *Graphis Afzelii* Ach. *Diplographis* Mass. was based on *G. rufula* Ach., now in *Graphis,* and *G. chlorocarpa* Fée, now in *Graphina. Limboria* Trev. *non* Ach. belongs here according to the description, although the species cited all belong elsewhere, i.e. *L. constellata* (Ach.) Trev. is now placed in *Diploschistes* and *L. tridens* (Eschw.) Trev. in *Phaeographis. Anomorpha* Nyl. and *Digraphis* Clements were both based on *A. turbulenta* Nyl., now usually placed in *Graphis.*

Thallus crustose, epi- or endophloeodal; ecorticate or with cortex of periclinal hyphae; algae *Trentepohlia.* Lirellae immersed to sessile, elongate or branched, very rarely short and rounded, lips nearly closed (connivent) to open, entire or sulcate; parathecium entire or dimidiate, carbonaceous or subhyaline; hypothecium thin, hyaline; paraphyses slender, unbranched, not thicker at the tips; asci clavate to subcylindric, septate, 2–many-locular, protoplasts lenticulate to subspherical; spermatia exobasidial, cylindric, relatively long (rarely observed).

1. Lirellae wholly densely white-pruinose 2
1. Lirellae not densely white-pruinose, disc sometimes slightly pruinose 4
2. Thallus rose color or partly paler; lirellae 0.2–7 mm. long, immersed; ascospores not seen, hence genus uncertain; Angola ..... *G. roseotincta* Vainio
2. Thallus scarcely visible except at bases of lirellae; São Thomé 3
2. Thallus powdery, bluish white; lirellae long, subflexuous, dimidiate; ascospores 35 × 9–10 μ (as in *G. scripta*); Kenya ..... *G. caesia* Müll. Arg.
2. Thallus yellowish; lirellae 2–3 (–4) × 1 mm., emersed; ascospores 16 × 8 μ, 4-locular; Guinea ..... *G. Afzelii* Ach.
2. Thallus pale yellow; lirellae immersed, disc open; ascospores 14–17 × 6 μ; São Thomé ..... *G. lynceodes* Nyl.
3. Ascospores 30–36 × 13–15 μ, 4-locular; lirellae 1 mm. or less long ..... *G. timidula* Nyl.
3. Ascospores 40–70 × 11–18 μ; lirellae 1–3 × 0.5 mm., lips sulcate ..... *G. albonotata* Nyl.

4. Parathecium hyaline or pale 5
4. Parathecium black, entire 6
4. Parathecium black, dimidiate 14
4. Parathecial structure unknown; ascospores 24–27 × 6–7 μ, 8-locular; thallus white; Mozambique ....*G. infida* Nyl.
5. Ascospores 12–13 × 6 μ, 4-locular; lirellae 0.5–1.3 mm. long; Usambara ....*G. hyalinella* Müll. Arg.
5. Ascospores 16 × 8 μ, 4-locular; lirellae up to 2 × 0.5 mm.; Nigeria ....*G. nigeriensis* Dodge
5. Ascospores 20 × 5 μ, 8-locular, with halo; thallus pale glaucous to white; lirellae immersed, 0.4–2.5 × 0.15–0.5 mm., ellipsoid; Mozambique ....*G. pallescens* Vainio
6. Ascospores 4-locular 7
6. Ascospores 8–10-locular; thallus white to glaucous 8
6. Ascospores 12–18-locular 12
7. Parathecium subimmersed, thin; ascospores 17–18 × 5–7.8 μ; Mozambique ....*G. myriocarpoides* Vainio
7. Parathecium emersed, thick on sides, very thin at base; ascospores 14–17 × 6–8 μ; Mozambique ....*G. triticella* Vainio
7. Parathecium emersed, thin but not thinner at base; ascospores 14–15 × 5–6 μ; Nigeria ....*G. Thoroldi* Dodge
8. Lirellae immersed or subimmersed 9
8. Lirellae semi- to completely emersed and sessile 10
9. Lirellae unbranched, flexuous; ascospores 23–40 × 7–9 μ, 8–10-locular; Ilha Principe ....*G. exalbata* Nyl.
9. Lirellae dichotomous, flexuous, 0.5–5 × 0.15–0.2 mm.; ascospores 20–22 × 6 μ, 8-locular; Mozambique ....*G. mocimbensis* Vainio
9. Lirellae radially branched, (0.7–) 2–4 × 0.1 mm.; ascospores 27.5–32 × 6–7.5 μ, 8–10-locular; Mozambique ....*G. myriocarpiza* Vainio
10. Lips open at maturity, disc pruinose; lirellae mostly unbranched, some forked; ascospores 50–56 × 10–12 μ, 8-locular; French Tropical Africa....*G. aperiens* v. *pruinosa* Hue
10. Lips connivent; thallus whitish 11
11. Ascospores 37–49 × 6–9 μ, 8–12-locular; lirellae short, unbranched; Guinea ....*G. comma* (Ach.) Sprgl.
11. Ascospores 25–35 × 6–7.5 μ, 8–10-locular; lirellae flexuous, unbranched or rarely forked, 0.6–0.8 × 0.1–0.15 mm.; thallus K—; Mozambique ....*G. subintricans* Vainio
11. Ascospores 24–26 × 7 μ, 8-locular; lirellae flexuous, branched, 0.7–2.5 × 0.15–0.2 mm.; thallus K yellow then red; Angola ....*G. Dracaenae* Vainio
12. Ascospores 32–45 × 7.5–8.5 μ; parathecium very thin at the base; lirellae emersed, 4–6 × 0.3 mm.; Kenya ....*G. oxyclada* Müll. Arg.
12. Ascospores 74–80 × 12–14 μ 13
12. Ascospores 90–135 × 12–17 μ; asci only 2–4-spored; lirellae emersed, 1–3 × 0.3 mm.; Usambara ....*G. superans* Müll. Arg.
13. Lirellae 2.5 mm. long, covered by thallus, lips entire; Usambara ....*G. Schroederi* Zahlbr.
13. Lirellae 4 mm. long, emersed, lips sulcate; Nigeria ....*G. ondensis* Dodge
14. Ascospores 4(-5)-locular; Mozambique 15
14. Ascospores 8–14-locular 17
15. Ascospore protoplasts connected by plasmodesmata (as in the Blasteniaceae); ascospores 18–20 × 7–8 μ ....*G. palmensis* Vainio
15. Ascospore protoplasts not connected 16
16. Ascospores 14–17 × 6–8 μ ....*G. triticella* Vainio
16. Ascospores 17.5–20 × 6–7 μ ....*G. Limae* Vainio
17. Lips striate-sulcate 18
17. Lips entire, not striate-sulcate 19
18. Ascospores 22–24 × 7 μ, without halo; Mozambique ....*G. increbrior* Vainio
18. Ascospores 32–42 × 8–9 μ, 8–12-locular; Guinea ....*G. striatula* (Ach.) Sprgl.
18. Ascospores 40–54 × 9–11 μ, 11–14-locular; lirellae long, curved, cuspidate on one side; Usambara ....*G. striatula* v. *cuspidata* Müll. Arg.
19. Lips connivent 20
19. Lips open, at least when moist 22
20. Thallus ochraceous; ascospores 25–38 × 7–8 μ, 10–14-locular; Angola ....*G. ochroplaca* Müll. Arg.
20. Thallus white to pale glaucous 21
21. Lirellae 0.3–0.7(–1) × 0.3–0.5 mm., straight, unbranched; ascospores 20–27 × 7–8.5 μ, 9-locular; Socotra ....*G. brachycarpa* Müll. Arg.

21. Lirellae 0.5(–1.8) × 0.25 mm., straight, unbranched; ascospores 30 × 8 μ, 8–10-locular; Sierra Leone ..... *G. Deightoni* Dodge
21. Lirellae very long and slender; ascospores 21–30 × 7–8 μ, 8–10-locular; Guinea.... *G. tenella* Ach.
21. Lirellae 4–6 × 0.3 mm., with 1–2 branches; ascospores 32–45 × 7.5–8 μ, 12-locular; Kenya ..... *G. oxyclada* Müll. Arg.
21. Lirellae 2 × 0.13 mm., curved, somewhat branched; ascospores 27 × 7–8 μ, 10-locular; Sierra Leone ..... *G. guineensis* Dodge
22. Ascospores 40–50 × 7–9 μ, 8–10-locular; thallus greenish white; lirellae 1–3 × 0.25 mm.; Usambara ..... *G. aterrima* Müll. Arg.
22. Ascospores 55 × 8 μ, 11–14-locular; thallus white, parathecium reddish black; Usambara ..... *G. erythrocardia* Müll. Arg.

Graphis Afzelii Ach., Syn. Lich. 85. 1814.

Dyplolabia Afzelii Mass., Neagenea Lich. 6. 1854.

Type: Guinea, corticole, Afzelius.

Thallus epiphloeodal, 75 μ thick, light brownish olive, without a black margin; cortex 25 μ thick, gelified, of periclinal, slender, thick-walled hyphae about 2 μ in diameter; algal layer 50 μ thick, of subvertical filaments of *Trentepohlia* about 4 μ in diameter; medulla not differentiated, but hyphae penetrating deeply between the bark cells. Lirellae straight, curved or flexuous, rarely once-forked, 2–3(–4) × 1 mm., about 0.3 mm. tall, densely white-pruinose, lips connivent, thalline cortex with an occasional algal cell extending halfway up the parathecium where it is replaced by a layer of slender vertical hyphae 4 μ in diameter, closely septate, somewhat gelified and decomposed, forming a layer about 80 μ thick; parathecium 80 μ thick above the thecium, expanding to 180 μ thick on the sides, narrowing abruptly at the level of the base of the thecium then expanding rapidly to 135 μ, making an acute angle with the bark and extending only slightly under the margin of the hypothecium, thus dimidiate, carbonaceous; hypothecium 25 μ thick, the lower half gelified, the upper half of deeply staining, densely woven, slender hyphae; thecium 90–105 μ tall; paraphyses slender, simple, tips not thickened; asci 8-spored, clavate, tips not thickened, 80–90 × 8–11 μ; ascospores ellipsoidal, 4-locular, 16 × 8 μ, terminal protoplasts spherical, central ones lenticular, connected by a very slender isthmus which is finally obliterated.

The shape of the parathecium is quite variable in cross-section in this species. The above description was based on *Deighton M4337*. In *Deighton M4408*, the lips are not so closely connivent, the thecium is wider, and the gelified layer of the hypothecium is 55–65 μ thick, slightly yellowish, resting on a thin, discontinuous layer of blackened bark cells. In Deighton M4629, the outer margin of the parathecium is not so conspicuously angled at the level of the base of the thecium. All collections cited agree closely in all other characters.

G. Afzelii differs from *G. nivea* Fée, Essai Crypt. Ecorces Officin. 47. 1824 (type from Peru on *Cinchona oblongifolia* Mutis), to which tropical American material should be referred instead of to *G. Afzelii*, in the thinner cortex and thallus, relatively thicker algal layer, lirellae dimidiate instead of entire and with a thinner base, lips not sulcate, broader and thinner parathecium, lower thecium and smaller asci and ascospores.

Sierra Leone: Njala (Kori), on *Peltophorum africanum* v. *speciosum*, F. C. Deighton M4337, on *Anisophyllea laurina*, F. C. Deighton M4408, on *Citrus aurantifolia*, F. C. Deighton M4629.

GRAPHIS **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Owena near Ondo, on *Theobroma*, C. A. Thorold 124.

Thallus epiphloeodes, ravus, 55 μ crassitudine, homoeomerus, filamentis verticalibus *Trentepohliae* 6 μ diametro et hyphis tenuibus intertextis cum crystallis ad 10 μ diametro. Lirellae flexuosae, usque ad 2 $\times$ 0.5 mm., simplices, labiis elevatis, subpruinosis, conniventibus mox delabentibus et discum pruinosum exponentibus; parathecium dimidiatum, superne 18–20 μ ad 25 μ in lateribus dilatatum, hyalinum vel pallide brunneum, hyphis tenuibus, septatis, 3–4 μ diametro, pseudoparenchyma formantibus; hypothecium 15 μ crassitudine, hyphis tenuibus dense contextum; thecium 65–70 μ altitudine, ad 360 μ latitudine; paraphyses tenues, simplices, apicibus non incrassatae; asci cylindrici, 65 $\times$ 12 μ; ascosporae octonae, imbricatim monostichae, hyalinae, 4-loculares, protoplastis terminalibus subconicis, centralibus rotundatis, ellipsoideae, 16 $\times$ 8 μ.

Thallus epiphloeodal, 55 μ thick, drab, cortex not differentiated; algal filaments of *Trentepohlia* about 6 μ in diameter, vertical and penetrating deeply between the bark cells; medulla not differentiated, but of slender, interwoven hyphae inclosing many hyaline crystals up to 10 μ in diameter between the algal filaments. Lirellae flexuous, up to 2 $\times$ 0.5 mm., unbranched, lips elevated, slightly pruinose, connivent, soon breaking away and exposing the pruinose disc; parathecium dimidiate, 18–20 μ thick above the thecium, up to 25 μ thick on the sides of the thecium, hyaline or pale brownish, of slender, septate hyphae 3–4 μ in diameter, forming a pseudoparenchyma; hypothecium 15 μ thick, of densely woven, deeply staining, slender hyphae; thecium 65–70 μ tall, 360 μ wide; paraphyses slender, unbranched, tips not thickened; asci cylindric, 8-spored, 65 $\times$ 12 μ; ascospores imbricately monostichous, hyaline, 4-locular, terminal protoplasts subconical, somewhat smaller than the rounded central ones, ellipsoidal, 16 $\times$ 8 μ.

GRAPHIS **Thoroldi** Dodge, sp. nov.

Type: Nigeria, Ina near Ibadan, on *Theobroma*, C. A. Thorold 151b.

Thallus epiphloeodes, laevis, 15–20 μ crassitudine, obscure olivaceo-griseus, homoeomerus, filamentis subverticalibus *Trentepohliae* 6–7 μ diametro. Lirellae rectae, 0.5–0.6 $\times$ 0.2 mm., emersae, nigrae, labiis conniventibus; parathecium integrum, carbonaceum, superne 15 ad 35 μ in lateribus et sub hypothecio dilatatum; hypothecium 15 μ crassitudine, hyphis tenuibus dense contextum; thecium 80 μ altitudine, 125 μ latitudine; paraphyses tenues apicibus subclavatis, brunneis; asci clavati, dein ellipsoideae, 55 $\times$ 16 μ; ascosporae octonae, hyalinae, 4-loculares, anguste ellipsoideae, 14–15 $\times$ 5–6 μ.

Thallus epiphloeodal, smooth, 15–20 μ thick, dark olive gray, homoeomerous, of subvertical, partly disorganized filaments of *Trentepohlia*, 6–7 μ in diameter, and slender hyphae, somewhat decomposed above, somewhat thicker near the

lirellae and disorganizing the cork cells to a depth of 80 μ, but the algae not penetrating between them. Lirellae straight, 0.5–0.6 $\times$ 0.2 mm., emersed, black, lips connivent; parathecium carbonaceous, entire, 15 μ thick at the lips, expanding to 35 μ on the sides and under the hypothecium, and blackening the cork cells to a depth of 55 μ below it; hypothecium 15 μ thick, of slender, densely woven hyphae; thecium 80 μ tall, 125 μ wide; paraphyses slender, tips slightly clavate, brownish in the epithecial gel, which is about 18 μ thick; asci clavate, becoming ellipsoidal, 8-spored, 55 $\times$ 16 μ; ascospores hyaline, 4-locular, 14–15 $\times$ 6 μ, narrowly ellipsoidal.

GRAPHIS **ondensis** Dodge, sp. nov.

Type: Nigeria, Ondo Province, Ipetu, on *Theobroma*, C. A. Thorold 120.

Thallus epiphloeodes, ad 55 μ crassitudine, laevis vel minute verrucosus, opacus, albidus; cortex 8 μ crassitudine, hyphis septatis periclinalibus, gelifactus, granulis minutis inspersus; stratum algarum 25 μ crassitudine, filamentis verticalibus *Trentepohliae* 5–6 μ diametro; medulla 22 μ crassitudine, hyphis tenuibus, magnis cum crystallis hyalinis. Lirellae emersae, 4 $\times$ 0.6 mm., curvatae vel flexuosae, margine sulcato, labiis conniventibus, thallo 40 μ crassitudine sine crystallis in medulla tectae; parathecium integrum, ad labias 15 μ, lateribus 230 μ, basi 80 μ crassitudine, cum 6–7 sulcis 60 μ altitudine, carbonaceum; hypothecium 25 μ crassitudine, hyphis tenuibus dense contextum; thecium cordiforme, 105 μ altitudine latitudineque; paraphyses tenues, pachydermeae, apicibus brunneis non incrassatis; asci cylindrici, 90 $\times$ 30 μ; ascosporae binae vel quaternae, hyalinae, 12-loculares, protoplastis rotundatis, pachydermeae, 80 $\times$ 14 μ.

Thallus epiphloeodal, up to 55 μ thick, smooth to minutely verrucose, surface dull, whitish; cortex 8 μ thick, gelified, of septate, periclinal hyphae inspersed with minute granules; algal layer about 25 μ thick, of loosely packed, vertical filaments of *Trentepohlia* 5–6 μ in diameter; medulla about 22 μ thick, of slender hyphae inclosing large hyaline crystals, penetrating about 35 μ into the cork cells but not disorganizing them. Lirellae emersed, about 4 $\times$ 0.6 mm., curved or flexuous, margin sulcate, lips connivent, covered by a layer of thallus 40 μ thick, but with few or no crystals in the medulla; parathecium entire, 15 μ thick at the lips, expanding to 230 μ thick on the sides and narrowing to 80 μ under the hypothecium, with 6–7 grooves extending about 60 μ deep, carbonaceous; hypothecium 25 μ thick, of slender, closely interwoven hyphae; thecium cordiform, 105 μ tall and broad; paraphyses slender, thick-walled, unbranched, tips brownish but not thickened; asci 2–4-spored, cylindric, 90 $\times$ 30 μ; ascospores about 12-locular, hyaline, protoplasts rounded, thick-walled, about 80 $\times$ 14 μ.

GRAPHIS **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Bauhinia tomentosa*, F. C. Deighton M4307E, M4307G.

Thallus epiphloeodes, albidus, anguste nigro-marginatus, 100 μ crassitudine; cortex decompositus, 8–10 μ crassitudine; stratum algarum 40 μ crassitudine,

filamentis verticalibus *Trentepohliae* 5–6 μ diametro; medulla 50 μ crassitudine, hyphis tenuibus laxe intertextis, magnis cum crystallis, ad cellulas suberosas magis compactis periclinalibusque. Lirellae rectae aut subcurvatae, 0.5 (1.8) mm. longitudine, semi-emersae, labiis conniventibus; parathecium dimidiatum, superne 15 μ, inferne usque ad 55 μ dilatatum, lateribus verticalibus non alatis, carbonaceum; hypothecium 15–20 μ crassitudine, hyphis tenuibus dense contextum; thecium 120 μ altitudine, 150 μ latitudine; paraphyses tenues, semel vel bis dichotome ramosae, apicibus subclavatis, cellula terminali 5–6 μ diametro; asci clavati dein subcylindrici, ca. 60 $\times$ 16 μ; ascosporae octonae, subclavatae, apice uno obtuso, altero magis acuto, 8–10-loculares, protoplastis lenticularibus, 30 $\times$ 8 μ.

Thallus epiphloeodal, whitish, narrowly black-margined, at least in contact with the thalli of other lichens, about 100 μ thick; cortex decomposed, 8–10 μ thick; algal layer 40 μ thick, of vertical filaments of *Trentepohlia* 5–6 μ in diameter; medulla 50 μ thick, of slender, loosely interwoven hyphae inclosing large, hyaline crystals, more compact and periclinal next the cork cells. Lirellae straight or slightly curved, 0.5 (–1.8) $\times$ 0.26 mm., semi-emersed, lips black, connivent; parathecium dimidiate (sometimes the outermost bark cells are blackened, then appearing entire but thinner at the base in thick sections), 15 μ thick above, expanding to 55 μ at the base, sides vertical, not winged at the base, carbonaceous; hypothecium 15–20 μ thick, seated on the yellowish to blackened bark cells, of slender, densely woven hyphae; thecium 120 μ tall, 150 μ broad; paraphyses slender, once or twice dichotomously branched, tips clavate, terminal cells brownish, 5–6 μ in diameter; asci clavate, becoming subcylindric, about 60 $\times$ 16 μ, 8-spored; ascospores hyaline, 8–10-locular, subclavate, one end obtuse, the other more acute, protoplasts lenticular, 30 $\times$ 8 μ.

GRAPHIS **guineensis** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Lagerstroemia speciosa*, F. C Deighton M4345.

Thallus epiphloeodes, ca. 25 μ crassitudine, laevis, pallide cinereus vel albidus; cortex 15 μ crassitudine, gelifactus, hyphis periclinalibus; stratum algarum ca. 10 μ crassitudine, filamentis periclinalibus *Trentepohliae* 5–6 μ diametro. Lirellae curvatae, 2 $\times$ 0.13 mm., rare furcatae, emersae, labiis conniventibus; parathecium dimidatum, carbonaceum, superne 15 μ, ad 35 μ inferne dilatum, basi subalatum; hypothecium 20 μ crassitudine, hyphis tenuibus dense contextum; thecium subcordiforme, 55 μ altitudine, 95 μ latitudine; paraphyses tenues, simplices; asci cylindrici; ascosporae octonae, curvatae, 10-loculares, 27 $\times$ 7–8 μ.

Thallus epiphloeodal, about 25 μ thick, margin indefinite, smooth, pale ashy to white; cortex 15 μ thick, gelified, of periclinal hyphae; algal layer about 10 μ thick, of periclinal filaments of *Trentepohlia* 5–6 μ in diameter, some penetrating between the bark cells; medulla not differentiated. Lirellae curved, up to 2 $\times$ 0.16 mm., some forked, emersed, lips connivent, black, sides covered with thallus; parathecium dimidiate, carbonaceous, lips 15 μ thick, sides 35 μ thick, very slightly

angled at the base; hypothecium 20 μ thick, of slender, densely woven hyphae; thecium subcordate, 55 μ tall, 95 μ wide; paraphyses slender, unbranched; asci 8-spored, cylindric; ascospores curved, 10-locular, 27 $\times$ 7–8 μ.

PHAEOGRAPHIS

Phaeographis Müll. Arg., Flora 65:336. 1882.

Leiorreuma Eschw., Syst. Lich. 14. 1824.
Pyrochroa Eschw., Syst. Lich. 15. 1824.
Platygramma Meyer, Nebenstudien, 332. 1825.
Leiogramma Eschw. in Martius, Icon. Pl. Crypt. Brasil. 2:11. 1828.
Graphidula Norm., Nyt Mag. Naturvidensk. 7:240. 1853.
Hymenodecton Leight., Ann. Mag. Nat. Hist. II, 13:387. 1854.
Chiographa Leight., Ann. Mag. Nat. Hist. II, 13:388. 1854.
Solenographa Mass., Atti I. R. Ist. Veneto III, 5:270. 1860.
Pyrrhographa Fée in Mass., Atti I. R. Ist. Veneto III, 5:272. 1860.
Theloschisma Trev., Conspect. Verruc. 14. 1860.

Type: none designated for *Phaeographis* Müll. Arg. *Leiorreuma* Eschw. was based on *Opegrapha Lyellii* Sowerby now in *Phaeographis*. When Eschweiler included *Leiorreuma* as a section of his *Leiogramma* in 1828, he added *Graphis scalpturata* Ach., now in *Phaeographina*, and *L. tartareum* Eschw., now in *Opegrapha*. In his section *Lecanactis* of *Leiogramma*, he included *L. sericeum* and *L. punctiforme* (both now in *Phaeographis*) and *L. pruinosum* (now in *Helminthocarpon*). *Pyrochroa* Eschw. was based on *Graphis coccinea* Holl and *P. flammula* Eschw., both now in *Phaeographis*, and *Graphis caribaea* Ach., now in *Arthonia*. *Platygramma* Meyer included *P. dendriticum*, *P. Lyellii* (both now in *Phaeographis*), and *P. suffultum* (now in *Phaeographina*). *Graphidula* Norm. is a *nomen nudum*, as no type was designated, nor new combinations made. *Hymenodecton* Leight. was based on *Graphis dendritica* Ach. *Chiographa* Leight. was based on *Opegrapha Lyellii* Sowerby. *Solenographa* Mass. was based on *Lecanactis confluens*, now in *Phaeographis*. *Pyrrhographa* Fée was based on *Pyrochroa flammula* and *P. medusulina*, both now in *Phaeographis*, and *P. javanica*, now in *Graphina*. *Theloschisma* was based on *T. Eschweileri* (Mont.) Trev. (*Verrucaria aspistea* Eschw. *non* Ach.).

From the above synonymy, it is obvious that many names antedate *Phaeographis* Müll. Arg. Since the latter name has been in constant use by most lichenologists for the last seventy years, a type species should be chosen and *Phaeographis* should be conserved, but without prejudice against older names if the genus is divided. There are several groups of species, now in *Phaeographis*, which differ in important characters and should be segregated as genera. It would be unfortunate, however, if this were done without a thorough study of the species from all regions. Until such a monograph is published, it seems wise to continue the use of *Phaeographis* for all Graphidaceae with brown, septate ascospores except those now placed in *Melaspilea*.

Thallus crustose, epi- or endophloeodal; ecorticate or with a cortex of periclinal hyphae; algae *Trentepohlia*. Lirellae immersed to sessile, elongate or branched, rarely short and rounded, lips connivent or open, entire or sulcate; parathecium entire or dimidiate, carbonaceous or subhyaline; hypothecium thin, hyaline; paraphyses slender, unbranched, tips not conspicuously clavate; asci clavate to subcylindric, 4–8-spored; ascospores brown, fusiform to ellipsoid or subcylindric, septate, protoplasts lenticular to subspherical; spermatia exobasidial, cylindric, relatively long (rarely observed).

1. Parathecium pale; ascospores 4-locular, 13–16 × 6 μ; lirellae oblong-difform, disc open, black, margin densely pruinose; São Thomé.....*P. subnivescens* (Nyl.) Zahlbr.
1. Parathecium black 2
2. Parathecium entire 3
2. Parathecium dimidiate 11
3. Parathecium thicker below, lips connivent, sulcate 4
3. Parathecium not conspicuously thicker below.....5
4. Ascospores 8–12-locular, 38–46 × 9–11 μ; on palm wood; Tanganyika.....*P. palmarum* Müll. Arg.
4. Ascospores 4-locular, 27–30 × 7–8 μ; corticole; Sierra Leone.....*P. Deightoni* Dodge
5. Lips connivent, disc very narrow; lirellae prominent, simple or slightly branched.....6
5. Lips widely divergent 8
6. Ascospores 4-locular; Mozambique 7
6. Ascospores 10–12-locular, 55–65 × 8–10 μ; lirellae orange-pruinose; Cameroons.....*P. ochracea* Dodge
6. Ascospores 16-locular, 85 × 15 μ; lirellae white-pruinose at first, soon nude and black; Sierra Leone .....*P. sierraleonensis* Dodge
7. Ascospores 16 × 7 μ; thallus K—.....*P. micrographa* (Vainio) Zahlbr.
7. Ascospores 18.2–23 × 6.5–7.5 μ; thallus K reddening.....*P. tigrinella* (Vainio) Zahlbr.
8. Lirellae innate, branched; ascospore size not given; Liberia.....*P. dendriticella* Müll. Arg.
8. Lirellae rounded, ellipsoid to oblong, not branched.....9
9. Foliicole; ascospores 6-locular, 20–22 × 6–7 μ; Angola.....*P. Phyllocharis* (Vainio) Zahlbr.
9. Corticole 10
10. Thallus endophloeodal; lirellae prominent, 0.3–1.5 × 0.2–0.3 mm., disc black or slightly pruinose; ascospores 6-locular, 18–28 × 6–7 μ; Angola.....*P. sexlocularis* (Vainio) Zahlbr.
10. Thallus thin, verrucose, shining, whitish; lirellae innate, 1–1.5 × 0.15–0.2 mm., disc not pruinose; ascospores 15.5–27 × 7–7.5 μ; Mozambique.....*P. subdevelans* (Vainio) Zahlbr.
11. Lips sulcate or striolate; ascospores 6-locular, 20 × 7.5 μ; Usambara.....*P. duplicans* Müll. Arg.
11. Lips striolate; ascospores 6-locular, 25 × 8–9 μ; lirellae 0.7 mm. broad, 2–3-furcate; Usambara .....*P. platycarpa* Müll. Arg.
11. Lips not sulcate or striolate, entire.....12
12. Ascospores 12 or more locular, 100–105 × 13 μ; asci 4-spored; lirellae covered by thallus, 3 mm. long, unbranched; Sierra Leone.....*P. tecta* Dodge
12. Ascospores 6–8-locular 13
12. Ascospores 4-locular 14
13. Lirellae simple or sparingly branched, 0.5–2.5 × 0.2 mm.; ascospores 6-locular, 20–30 × 6–8 μ; Angola .....*P. navicularis* (Vainio) Zahlbr.
13. Lirellae simple, 0.5–2 × 0.2–0.25 mm.; ascospores 6–8-locular, 23–26 × 6.5–7.5 μ; Congo .....*P. paragrapta* Müll. Arg.
13. Lirellae radially branched, immersed, 1–1.5 × 0.2 mm., disc open, pruinose; ascospores 28–38 × 9 μ; Socotra.....*P. inusta* v. *radians* Müll. Arg.
14. Lirellae simple or sparingly branched, immersed.....15
14. Lirellae dichotomously and partly radially branched, 1–4 × 0.1 mm., subimmersed; Mozambique 16
15. Lirellae simple or sparingly branched, 0.2–2.5 × 0.1–0.5 mm.; ascospores 9–16 × 4–7 μ; lignicole; Mozambique .....*P. lignatilis* (Vainio) Zahlbr.
15. Lirellae simple, white-pruinose; ascospores 14–18 × 6 μ; corticole; São Thomé.....*P. lynceodes* (Nyl.) Zahlbr.
16. Ascospores 17–19 × 6–8 μ.....*P. micrographoides* (Vainio) Zahlbr.
16. Ascospores 21 × 8 μ.....*P. leucothallina* (Vainio) Zahlbr.

Phaeographis **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Amphimas pterocarpoides*, F. C. Deighton M4334A.

Thallus endophloeodes, albidus. Lirellae rectae, subfusiformes, sessiles, 1 × 0.25 mm., nigrae, labiis conniventibus, sulcatis; parathecium integrum, carbonaceum, basi 185 μ crassitudine, in lateribus ad 55 μ tenuescens; thecium 135 μ altitudine; paraphyses tenues, apicibus non incrassatis; asci clavati; ascosporae octonae, distichae, 4-loculares, brunneae, rectae vel subcurvatae, ellipsoideae vel subfusiformes, 27–30 × 7–8 μ.

Thallus endophloeodal, whitish, consisting of a few *Trentepohlia* cells and hyphae between the partly disorganized bark cells, making the surface silvery-ashy. Lirellae straight, subfusiform, sessile, about 1 × 0.25 mm., black, lips connivent, somewhat sulcate-striate; parathecium entire, carbonaceous, 185 μ thick below, thinning to 55 μ thick on the sides; thecium 135 μ tall; paraphyses slender, tips not thickened; asci 8-spored, clavate; ascospores distichous, ellipsoid to subfusiform, brown, straight or slightly curved, 4-locular, 27–30 × 7–8 μ.

Phaeographis **ochracea** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Bauhinia tomentosa*, F. C. Deighton M4307G.

Thallus epiphloeodes, 80 μ crassitudine, minute verrucosus, nitidus, pallide olivaceo-griseus; cortex 25–30 μ crassitudine, hyphis periclinalibus, 3 μ diametro, gelifactis; stratum algarum 50–55 μ crassitudine, filamentis verticalibus *Trentepohliae* 3–4 μ crassitudine, magnis cum crystallis; medulla non evoluta. Lirellae sessiles, rectae vel subcurvatae, rarissime dichotome ramosae, 1–2.5 × 0.5 mm., labiis conniventibus, obscure sulcatis, aurantiaco-pruinosis; parathecium dimidiatum, carbonaceum, 15–30 μ crassitudine ad labias, 30–45 μ ad latera, usque ad 185 μ in alis dilatatum; thecium cordiforme, 80–105 μ altitudine latitudineque; paraphyses tenues, apicibus non incrassatis, sed cum crystallis brunneis; asci clavati dein ellipsoidei, 100 × 25 μ; ascosporae octonae, subcylindrici, brunneae, 10–12-loculares, 55–65 × 8–10 μ.

Thallus epiphloeodal, 80 μ thick, minutely verrucose, shining, pale olive gray; cortex 25–30 μ thick, of gelified periclinal hyphae 3 μ in diameter; algal layer 50–55 μ thick, of disorganized, vertical filaments of *Trentepohlia* 3–4 μ in diameter, with very large hyaline crystals (such as one sees in the Thelotremaceae). Lirellae sessile, straight or slightly curved, very rarely once-forked, 1–2.5 × 0.5 mm., lips connivent, very obscurely sulcate, covered by cortex at first, then the cortex cracking away, exposing powdery orange material about the parathecium; amphithecium consisting of thalline cortex and alcohol-soluble, orange material which replaces the algal layer on the sides of the parathecium, but not extending into the thallus proper; parathecium dimidiate, carbonaceous, about 15–30 μ thick at the lips, 30–45 μ on the sides and expanding to 185 μ where it makes an acute angle with the bark cells which are sometimes blackened to a depth of 55 μ below

the thecium (thus giving the appearance of an entire parathecium); thecium cordiform, 80–105 μ tall and broad; paraphyses slender, tips not thickened but the epithecium covered with brownish crystals; asci 100 $\times$ 25 μ, clavate, becoming ellipsoidal, 8-spored; ascospores subcylindric, 55–65 $\times$ 8–10 μ when pale brown, 9–11-septate, shrinking to 30 $\times$ 6 μ when very dark brown.

After the thecium has partly disintegrated, a new thecium forms below the old hypothecium (seen in most of the lirellae sectioned in *Thorold 121*). As the new parathecium expands, the old parathecium breaks away at the junction with the new parathecium, the scars leaving the new parathecium shallowly sulcate when this has been repeated about four or more times, as the new parathecium is covered by a new outgrowth of the thallus to form each new parathecium. Only a single, shrunken but very dark brown spore was found in *Thorold 121* after repeated sectioning of various lirellae, but the other structures agree well with those of the Sierra Leone material.

Sierra Leone: Njala (Kori), on *Bauhinia tomentosa,* F. C. Deighton M4307G.
Cameroons: Tombel, on *Theobroma,* C. A. Thorold 121.

PHAEOGRAPHIS **sierraleonensis** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twig of *Bauhinia tomentosa,* F. C. Deighton M4307Ga.

Thallus epiphloeodes, 70–80 μ crassitudine, minutissime verrucosus, pallide olivaceo-griseus; cortex 25 μ crassitudine, decompositus, hyphis periclinalibus gelifactus; stratum algarum 45–55 μ crassitudine, filamentis verticalibus *Trentepohliae* 6–7 μ diametro; medulla non evoluta. Lirellae usque ad 2 $\times$ 0.4 mm., rectae vel flexuosae, elevatae, juventute cortice thallino tecta, dein nudae, nigrae; labiis conniventibus; parathecium integrum, carbonaceum, superne 15 μ crassitudine, in lateribus 120 μ et sub hypothecio 80 μ, margine subalato; hypothecium 20 μ crassitudine, hyphis tenuibus dense contextum; thecium 160 μ altitudine, 200 μ latitudine; paraphyses tenues, super ascos dichotome ramosae, cellulis ultimis clavatis vel rotundatis, 3 μ diametro, crystallis subbrunneis minutis tectis; asci clavati dein ellipsoidei, 100 $\times$ 40 μ; ascosporae octonae?, 16-loculares, protoplastis rotundatis, brunneae, 85 $\times$ 15 μ.

Thallus epiphloeodal, 70–80 μ thick, very minutely verrucose, light olive gray; cortex 25 μ thick, decomposed, of predominantly periclinal, gelified hyphae; algal layer 45–55 μ thick, of vertical filaments of *Trentepohlia* 6–7 μ in diameter; medulla not differentiated. Lirellae up to 2 $\times$ 0.4 mm., straight or flexuous, unbranched, elevated, covered by a thin thalline cortex when young, finally nude and black in the upper portion; lips connivent; parathecium entire, carbonaceous, 15 μ thick at the lips, expanding to 120 μ on the sides and 80 μ thick below the hypothecium, slightly winged; hypothecium 20 μ thick, of slender, densely woven hyphae; thecium 160 μ tall, 200 μ broad; paraphyses slender, once or twice dichotomous above the asci, terminal cells clavate to subspherical, 3 μ in diameter, covered with minute brownish crystals; asci clavate, becoming ellipsoidal, 8-

spored?, 100 × 40 μ; ascospores long remaining hyaline, finally becoming brown, 16-locular, protoplasts somewhat rounded, about 85 × 15 μ.

Phaeographis **tecta** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Bauhinia tomentosa*, F. C. Deighton M4307 pro parte minore.

Thallus epiphloeodes, 40 μ crassitudine, albidus; cortex gelifactus, 15 μ crassitudine, hyphis periclinalibus; stratum algarum 25 μ crassitudine, filamentis *Trentepohliae* periclinalibus ca. 6 μ diametro; medulla non evoluta. Lirellae ad 3 × 0.4 mm., flexuosae, strato thallino tectae, labiis conniventibus; parathecium carbonaceum, dimidiatum, ad labias 30 μ crassitudine, lateribus ad 150 μ, extus intusque alatae; hypothecium centro 25 μ crassitudine ad margines tenuescens, hyphis tenuibus dense contextum; thecium cordiforme, 130 μ altitudine, 180 μ latitudine, dein rotundatum; paraphyses tenues, super ascos dichotome ramosae, cellulis terminalibus clavatis, brunneis, 4 μ diametro; asci ellipsoidei, 105 × 27 μ; ascosporae quaternae, brunneae, 12- aut pluri-loculares, protoplastis lenticularibus 100–105 × 13 μ.

Thallus epiphloeodal, whitish, about 40 μ thick; cortex gelified, 15 μ thick, of periclinal hyphae; algal layer 25 μ thick, of loosely arranged, periclinal filaments of *Trentepohlia* about 6 μ in diameter; medulla not differentiated. Lirellae up to 3 × 0.4 mm., flexuous, completely covered by a thin layer of thallus, lips connivent; parathecium carbonaceous, dimidiate, 30 μ thick above the thecium expanding to 150 μ at the base in contact with the bark cells, angled both without and within; hypothecium 25 μ thick in the center, thinning toward the margin, of deeply staining, densely interwoven hyphae; thecium cordiform then rounded, 130 μ tall, 180 μ wide; paraphyses slender, dichotomous above the asci, terminal cells clavate, brown, 4 μ in diameter; asci 4-spored, ellipsoidal, 105 × 27 μ; ascospores finally brownish, 12 or more locular, protoplasts lenticular, 100–105 × 13 μ.

In very old lirellae, the thallus and tops of the lips weather away, exposing the narrow disc, and the tops of the lirellae appear somewhat pruinose. Below the hypothecium, one or two layers of bark cells are blackened, giving the appearance of an entire parathecium with a very thin base in thick sections. Apparently the browning of the spore occurs late, so that nearly mature spores might be looked for in *Graphis*.

Phaeographis lynceodes Zahlbr., Cat. Lich. Univ. 2:381. 1923.

Graphis lynceodes Nyl., Flora 69:174. 1886.

Type: São Thomé, Bom Successo, 1150 m., corticole, A. Moller, comm. Henriques.

Thallus epiphloeodal, about 65 μ thick, deep olive buff; cortex 25 μ thick, of compact, more or less vertical, slender hyphae, the outer 6 μ partly decomposed, with abundant minute crystals; algal layer of *Trentepohlia* filaments about 6 μ in diameter, more or less periclinal, rather few; medulla of slender, loosely woven hyphae with lacunae, in other portions more densely woven. Lirellae variable in

shape, mostly short and rounded, often confluent in somewhat curved lines, margin and open disc densely but minutely white-pruinose, immersed or nearly so; parathecium dimidiate, about 10 μ thick, not wider at the base, deep brown; hypothecium poorly developed, about 6 μ thick; thecium 55–60 μ tall; paraphyses slender, unbranched, tips not thickened; asci broadly clavate, about 40 $\times$ 8 μ, walls slightly thickened when young, 8-spored; ascospores early pale brown, 4-locular, protoplasts somewhat rounded, 14–18 $\times$ 5–6 μ.

In the lirella sectioned, cell division of the ascospore is slower and less synchronous than is usual in the Graphidaceae. Even after the ascospores in the ascus have begun to turn brown and they have reached nearly the mature size, both 2-locular and 3-locular ones may be observed. The systematic position of this species is somewhat doubtful. Nylander states that it is close to *Graphis (Phaeographis) inusta* in the *G. (Phaeographis) dendritica* group. Our material, though scant, agrees closely with Nylander's description except for hyaline spores.

Cameroons: Tombel, on *Theobroma*, C. A. Thorold 136, growing with *Pyrenula heteroclita* Ach., *P. mamillana* (Ach.) Trev., and *Sarcographa labyrinthica* (Ach.) Müll. Arg.

GRAPHINA

GRAPHINA Müll. Arg., Flora 63:22. 1880.
Diorygma Eschw., Syst. Lich. 13. 1824.
Leucogramma Meyer, Nebenstudien, 331. 1825.
Hemithecium Trev., Spighe e Paglie, 12. 1853.
Thalloloma Trev., Spighe e Paglie, 13. 1853.
Glaucinaria Mass., Atti I. R. Ist. Veneto III, 5:319. 1860.
Stenographa Mudd, Man. Brit. Lich. 235. 1861.

Type: not designated. *Diorygma* Eschw. was based on *D. tinctorum* Eschw. (figured). *Leucogramma* Meyer was based on *L. turgidum, L. plicatum, L. confertum, L. serpentarium, L. raddacense* and *L. carneum*, all placed as *species dubiae* in *Graphina* by Zahlbruckner; none of them have been reported since the original descriptions in Sprengel, Syst. Veg. 4:2:327. 1827. *Hemithecium* Trev. was based on six species, of which all but *H. chrysenteron* (Mont.) Trev. remain in *Graphina* as now used. *Thalloloma* Trev. and *Stenographa* Mudd were both based on *Ustalia anguina* Mont. *Glaucinaria* Mass. was based on *Graphis Poitiaei* Fée, *G. hololeuca* Mont., *G. Junghuhnii* Mont., and *G. raddacensis* Meyer.

From the above synonymy, it is evident that we have a case parallel to that of *Phaeographis* with many names antedating *Graphina* Müll. Arg., although the latter has been in general use since its publication. In the same way, a type species should be chosen and *Graphina* Müll. Arg. conserved without prejudice against older names, if the genus is divided.

Thallus crustose, epi- or endophloeodal, ecorticate or with a cortex of longitudinal hyphae; algae *Trentepohlia*. Lirellae immersed to sessile, elongate or branched, lips connivent to open, entire or sulcate; parathecium entire or dimidiate,

carbonaceous to hyaline; hypothecium thin, hyaline; paraphyses slender, unbranched; asci cylindric to somewhat rounded; 1–8-spored; ascospores muriform, hyaline, protoplasts rounded.

1. Lirellae radiately branched, lips connivent; parathecium not described; ascospores 25–27 × 8–11 μ, 6–8-locular, 2–3-locellate; asci 6–8-spored; thallus thin; Cormoro Archipelago ..... *G. abstracta* (Krmplhbr.) Müll. Arg.
1. Lirellae simple or very sparingly branched 2
2. Lirellae immersed or nearly so 3
2. Lirellae emersed to sessile 5
3. Asci 6–8-spored; ascospores 16–23 × 9–12 μ, 4–6-locular, 2-locellate; lateral parathecium thin, olive fuscous; Zanzibar coast ..... *G. pyrenuloidea* Müll. Arg.
3. Asci 4-spored; ascospores 80 × 22 μ, 20-locular, 10-locellate; parathecium absent; Sierra Leone ..... *G. arthothelioides* Dodge
3. Asci 4-spored; ascospores 96–100 × 36 μ, 28-locular, 6–8-locellate; parathecium fulvous, entire, lips connivent, sulcate; Sierra Leone ..... *G. Deightoni* Dodge
3. Asci monosporous; parathecium pale, lips open 4
4. Ascospores 70–85 μ long; lirellae 3–4 × 0.3 mm.; Abyssinia ..... *G. aethiopica* Müll. Arg.
4. Ascospores 75–106 × 30–44 μ; lirellae 0.2–2 × 0.15–0.25 mm.; thallus 300–600 μ thick; Angola ..... *G. ulcerata* (Vainio) Zahlbr.
5. Parathecium entire 6
5. Parathecium dimidiate or base hyaline; asci 1–2-spored 8
5. Parathecium scarcely developed; thallus pale clay, subpulverulent; asci 2–6-spored; ascospores 27–40 × 13–16 μ, 6–10-locular, 3–4-locellate; Socotra ..... *G. socotrana* Müll. Arg.
6. Parathecium greenish or pale fuscescent; thallus ashy olive, tuberculate, sorediose; asci 8-spored; ascospores 25–35 × 10 μ, finally brown; Angola (probably belongs in *Phaeographina*) ..... *G. sorediella* Müll. Arg.
6. Parathecium darker; thallus not sorediose; asci 1–4-spored 7
7. Parathecium fuscous-rufous or paler; lips open; lirellae 0.7–2.5 × .06–0.7 mm.; ascospores solitary, 110–150 × 25–40 μ; Angola ..... *G. straminea* (Vainio) Zahlbr.
7. Parathecium fulvous, lips connivent; lirellae 3 × 1 μ; asci 4-spored; ascospores 96–100 × 36 μ; Sierra Leone ..... *G. Deightoni* Dodge
7. Parathecium black; thallus white, wrinkled; ascospores solitary, 66–120 × 21–23 μ; Ilha Principe ..... *G. rudescens* (Nyl.) Zahlbr.
8. Lips sulcate, black above, paler below; thallus pale ochre; ascospores 80–120 × 28–34 μ; Usambara ..... *G. Brunnthaleri* Zahlbr.
8. Lips entire, thallus ashy white 9
9. Ascospores 23–26 × 8 μ, 8-locular, 2–3-locellate; lirellae 0.7–1 × 0.25–0.3 mm.; Socotra ..... *G. varians* Müll. Arg.
9. Ascospores 30–68 × 14–22 μ 10
9. Ascospores 100 × 25 μ; lirellae 1–2.5 × 0.3 mm.; Usambara ..... *G. subbiascens* Müll. Arg.
10. Lirellae 0.8–1.25 × 0.2–0.25 mm.; ascospores 60–68 × 16–18 μ (90–110 × 21–32 μ when solitary); Kenya ..... *G. heterospora* Steiner
10. Lirellae 0.7–3 × 0.25–0.5 mm.; ascospores 30–60 × 14–22 μ; Mozambique ..... *G. Pelletieri* v. *macrior* (Vainio) Zahlbr.
10. Lirellae 2–6 × 0.3–0.4 mm.; ascospores 54–65 × 14–16 μ; Angola ..... *G. ambrizensis* (Vainio) Zahlbr.

Graphina **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on *Citrus aurantifolia*, F. C. Deighton M4630.

Thallus epiphloeodes, cartilagineus, 200 μ crassitudine (usque ad 575 μ circa parathecium), obscure griseo-olivaceus; cortex 80–95 μ crassitudine, hyphis verticalibus dense intertextis, partim decompositus et minutis cum granulis obscuris nubilatus; stratum algarum 55 μ crassitudine, discontinuus, filamentis verticalibus *Trentepohliae* 7–8 μ diametro, cellulis brevibus, subrotundatis; medulla 50–65 μ crassitudine, hyphis periclinalibus, tenuibus, dense contexta. Lirellae rectae vel subcurvatae, 3 × 1 mm., labiis conniventibus, pluries sulcatis; parathecium in-

tegrum, fulvum, labia intima 105 μ crassitudine, fulva, pallidiori ad thecium; thecium 270 μ altitudine; paraphyses tenues, apicibus non incrassatis; asci subcylindrici, 245 $\times$ 32 μ; ascosporae quaternae, subdistichae, hyalinae, 28-loculares, 6–8-locellatae, 96–100 $\times$ 36 μ.

Thallus epiphloeodal, cartilaginous, margin indefinite, 200 μ thick (up to 575 μ thick next the parathecium), deep grayish olive; cortex 80–95 μ thick, of densely woven, predominantly vertical hyphae, the outer 20 μ partly decomposed and nubilated with minute, dark granules; algal layer about 55 μ thick, somewhat discontinuous, of short, mostly vertical filaments of *Trentepohlia* 7–8 μ in diameter, cells short and somewhat rounded; medulla 50–65 μ thick, of densely woven, slender hyphae, mostly periclinal, containing some disorganized bark cells. Lirellae straight to somewhat curved, about 3 $\times$ 1 mm., tilleul buff, lips connivent, several times sulcate in older lirellae; parathecium entire, innermost lip fulvous, 105 μ thick, paler next the thecium; thecium 270 μ tall; paraphyses slender, tips not thickened; asci subcylindric, about 4-spored, 245 $\times$ 32 μ; ascospores subdistichous, hyaline, about 28-locular, 6–8-locellate, 96–100 $\times$ 36 μ when free from the ascus.

GRAPHINA ULCERATA Zahlbr., Cat. Lich. Univ. 2:429. 1923.

Graphis ulcerata Vainio, Cat. Welwitsch Afric. Pl. 2:438. 1901.

Type: Angola, Golungo Alto, Cungulungulo, corticole, Welwitsch 245.

Thallus epiphloeodal, rimose subareolate, tea green, 300–600 μ thick (only 200 μ thick in our material); cortex scarcely differentiated, decomposed, about 5 μ thick; algal layer about 40 μ thick, of *Trentepohlia*, cells about 5–6 μ in diameter, filaments disorganized in a rather compact tangle of slender hyphae; medulla about 165 μ thick, very loosely woven, with some disorganized bark cells in the lower portion. Lirellae immersed, rounded or elongate, mostly curved and forked, 0.2–2 $\times$ 0.15–0.25 mm., covered by the thallus when young, then lips spreading and disc open at maturity; disc chalky white, pruinose, plane, level with the thalline margin; parathecium entire, about 30 μ thick, tawny, of thick-walled hyphae; hypothecium about 30 μ thick, of slender, densely woven, deeply staining hyphae; thecium 105–110 μ tall; paraphyses slender, unbranched, tips not thickened but covered by a tawny granular material in the upper 10 μ; asci clavate at first, becoming ellipsoid, monosporous, about 100 $\times$ 25 μ (immature); ascospores hyaline, about 20-locular, 6-locellate, 75–106 $\times$ 35–44 μ when free from the ascus.

Our specimens have a somewhat thinner thallus with most ascospores nearer the lower limits of the size given by Vainio.

Nigeria: Ina near Ibadan, on *Theobroma*, C. A. Thorold 119.

Sect. **Platygrammodes** Dodge, sect. nov.

Type: *Graphina arthothelioides* Dodge, the only species known so far.

Lirellae innatae, disco primo a thallo tecto, dein aperto; parathecio nullo.

Lirellae innate at first, covered by a thin layer of thallus, disc finally open and level with the thallus; parathecium absent.

The complete absence of the parathecium separates this section from all others in the genus. Perhaps it is closest to the dimidiate sect. *Platygrammina* Müll. Arg. and the entire sect. *Platygraphina* Müll. Arg., in both of which the pale parathecium is less well developed than in the other sections. *Platygrammodes* bears the same relation to *Platygrammina* that the Lecanoraceae bear to the Lecideaceae. The complete absence of parathecium suggests *Arthothelium* of the Arthoniaceae, but all the structures of the thecium are clearly those of *Graphina*.

GRAPHINA **arthothelioides** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Bauhinia tomentosa*, F. C. Deighton M4307F.

Thallus epiphloeodes, pruinosus, 130 μ crassitudine, pallide griseus; ecorticatus; stratum algarum 40 μ crassitudine, filamentis *Trentepohliae* 3–4 μ diametro, cellulis cylindricis vel subellipsoideis; medulla gelifacta, hyphis 2 μ diametro laxe intertexta. Lirellae orbiculares vel oblongae, rectae vel curvatae, usque ad 2 $\times$ 0.5 mm., ex thallo erumpentes, disco pruinoso pallide alutaceo; parathecium verum non evolutum; hypothecium 13 μ crassitudine, parce evolutum; thecium 120 μ altitudine; paraphyses tenues, apicibus non incrassatis; asci clavati dein ellipsoidei, 170 $\times$ 28 μ; ascosporae juventute quaternae sed maturae binae, hyalinae, ellipsoideae, 20-loculares, 10-locellatae, 80 $\times$ 22 μ.

Thallus epiphloeodal, margin indefinite, pruinose, about 130 μ thick, light mineral gray; ecorticate; algal layer 40 μ thick, with occasional cells deep in the medulla, cells varying from cylindric to subellipsoid, the filaments of *Trentepohlia* curved and partly disorganized, 3–4 μ in diameter; medulla 90 μ thick, highly gelified, with loosely woven hyphae about 2 μ in diameter. Lirellae round to oblong, straight or curved, up to 2 $\times$ 0.5 mm., erumpent from the thallus, covered by a thin layer of thallus which finally peels off, leaving an open, flat, pruinose, pale buff disc level with the surrounding thallus; true lips and parathecium not differentiated; hypothecium about 13 μ thick, scarcely differentiated; thecium 120 μ tall; paraphyses slender, tips not thickened; asci clavate at first, becoming ellipsoid at maturity, 107 $\times$ 28 μ, 4-spored at first but usually two ascospores abort, leaving only two mature ascospores; ascospores hyaline, ellipsoid, muriform, 20-locular, 10-locellate, 80 $\times$ 22 μ.

PHAEOGRAPHINA

PHAEOGRAPHINA Müll. Arg., Flora 65:398. 1882.

Thecaria Fée, Essai Crypt. Ecorces Officin. 97. 1824.
Ectographa Trev., Spighe e Paglie, 11. 1853.
Thelographis Nyl., Mém. Soc. Sci. Nat. Cherbourg 5:130. 1857, *nom. nud.*
Megalographa Mass., Atti I. R. Ist. Veneto III, 5:317. 1860.
Thecographa Mass., Atti I. R. Ist. Veneto III, 5:316. 1860.
Pliarona Mass., Atti I. R. Ist. Veneto III, 5:318. 1860.
Leucogramma Mass., Atti I. R. Ist. Veneto III, 5:320. 1860, *non* Meyer, 1825.

Creographa Mass., Verhandl. K. K. Zool.-bot. Ges. Wien 10:686. 1860.
Leiorreuma Mass., Atti I. R. Inst. Veneto III, 5:319. 1860, non Eschw., 1824.

Type: not designated. *Thecaria* Fée was based on *T. quassiaecola* Fée (now in *Phaeographina*). *Ectographa* Trev. was based on *Graphis scalpturata* Ach. (now in *Phaeographina*) and *Opegrapha Poitiaei* Fée (now in *Graphina*). *Thelographis* Nyl. was based on *Graphis polymorpha* Fée. *Megalographa* Mass. was based on M. *hysterina* Mass. *Thecographa* Mass. was based on *T. ceramia* Mass. (now in *Phaeographina*). *Pliarona* Mass. was based on *Graphis Montagnei* v. d. Bosch (now in *Phaeographina*). *Leucogramma* Mass., *non* Meyer, was based on *Graphis chrysenteron* Mont. (now in *Phaeographina*). *Creographa* Mass. was based on *C. brasiliensis* Mass. (now in *Phaeographina*). *Leiorreuma* Mass., *non* Eschw., was based on *Opegrapha sordida* Fée, *O. depressa* Mont. & v. d. Bosch, *O. streblocarpa* Bél., and *Graphis scalpturatum* Ach., the last two transferred to *Phaeographina* by Müller Argau, the rest probably incorrectly transferred to *Graphina* by Zahlbruckner, as Massalongo states the muriform ascospores finally become brown.

From the above synonymy, it is evident that we have a case parallel to those of *Phaeographis* and *Graphina,* with many names antedating *Phaeographina* Müll. Arg., although the latter has been in general use since its publication. In the same way, a type species should be chosen and *Phaeographina* conserved without prejudice against older names, if the genus is divided.

Thallus crustose, epi- or endophloeodal, ecorticate or with a cortex of periclinal hyphae; algae *Trentepohlia.* Lirellae immersed to sessile, elongate or branched, lips connivent to open, entire or sulcate; parathecium entire or dimidiate, carbonaceous to hyaline; hypothecium thin, hyaline; paraphyses slender, unbranched; asci cylindric to somewhat rounded, 1–8-spored; ascospores muriform, brown, protoplasts rounded.

1. Disc pruinose 2
1. Disc not conspicuously pruinose 7
2. True parathecium absent, a pseudo-parathecium of bark cells and hyphae, forming dark brown lips, paler and thinner below; asci monosporous; ascospores 72 × 19 μ, 20-locular, 10-locellate; Sierra Leone ..... *P. innata* Dodge
2. True parathecium present 3
3. Asci monosporous; parathecium dark or black above, paler below 4
3. Asci 8-spored 5
4. Ascospores 45–90(–100) × 15–20 μ, 10–18-locular, 3–5-locellate; Usambara ..... *P. caesiopruinosa* f. *striolata* Zahlbr.
4. Ascospores 72–95 × 21–24 μ, 20-locular, 5–6-locellate; Sierra Leone ..... *P. Deightoni* Dodge
5. Parathecium wholly pale or brownish, not darker above 6
5. Parathecium dark fuscous, dimidiate; ascospores 42–48 μ long, 9–10-locular, (2)–3-locellate; lirellae subsessile, rounded to oblong, 0.7 mm. in diameter, cupulate, margin elevated, inflexed; Guinea ..... *P. pezizoidea* (Ach.) Müll. Arg.
6. Parathecium pale; ascospores 28–33 × 12–13 μ, 6-locular, 2–4-locellate; Mozambique ..... *P. mozambica* (Vainio) Zahlbr.
6. Parathecium pale brown; ascospores 29–32 × 12–13 μ, 8-locular, 3-locellate; Sierra Leone ..... *P. scriptitata* Dodge
6. Parathecium not described, probably pale; ascospores 50–75 × 18 μ; thallus hypophloeodal; São Thomé ..... *P. leucophora* (Nyl.) Dodge
7. Disc dark blood-red, lips open; ascospores 70–135 × 21–36 μ; thallus 70 μ thick; lirellae sessile, constricted at the base; São Thomé ..... *P. deducta* (Nyl.) Zahlbr.
7. Disc rufo-fuscous, lips connivent; ascospores 190 × 50–60 μ; thallus 2–5 mm. thick; lirellae immersed; Socotra ..... *P. Balfourii* Müll. Arg.
7. Disc not reddish 8

8. Lirellae immersed 9
8. Lirellae sessile 10
9. Ascospores 25–35 × 10 μ; thallus ashy olive, tuberculose, sorediose; Kenya ..... *Graphina sorediella* Müll. Arg.
9. Ascospores 110 × 26 μ; thallus dark fuscous, rimulose-areolate; Angola ..... *P. fuscescens* (Vainio) Zahlbr.
10. Parathecium entire, hyaline, subobsolete; ascospores 25–30 × 11–13 μ, 4–6-locular, 2-locellate; Kenya ..... *P. paucilocularis* Müll. Arg.
10. Parathecium dimidiate 11
11. Parathecium thin, not winged, dark brown; ascospores 45–50 × 15–18 μ, 10-locular, 5-locellate; Sierra Leone ..... *P. leptotremoides* Dodge
11. Parathecium thicker, winged at the base, carbonaceous; ascospores 170 × 30 μ, about 20-locular and 8-locellate; Sierra Leone ..... *P. alata* Dodge

PHAEOGRAPHINA **innata** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Anisophyllea laurina,* F. C. Deighton M4625.

Thallus obscure olivaceo-alutaceus, hypophloeodes, ad 40 μ crassitudine, cellulis suberosis emortuis, hyphis periclinalibus et filamentis *Trentepohliae* 4–5 μ diametro. Lirellae immersae, usque ad 4 × 0.7 mm., curvatae, rare furcatae, apertae, disco albido-pruinoso; pseudoparathecium cellulis suberosis hyphisque, labiis nigro-brunneis inferne brunneum; hypothecium 15 μ crassitudine, hyphis tenuibus dense contextum; thecium 110 μ altitudine, 375 μ latitudine; paraphyses tenues, semel vel bis dichotome ramosae, apicibus non incrassatis, crystallis minutis brunneis tectis; asci monospori, ellipsoidei juventute pachydermei, 80 × 24 μ; ascosporae brunneae, murales, 72 × 19 μ, saltem 20-loculares, 10-locellatae.

Thallus deep olive buff, mostly hypophloeodal, but forming a layer up to 40 μ thick, containing some disorganized bark cells, gelified, very slender, periclinal hyphae, and more or less disorganized filaments of *Trentepohlia* 4–5 μ in diameter. Lirellae immersed, up to 4 × 0.7 mm., curved, sometimes once-dichotomous, open, disc white-pruinose; no true parathecium but a pseudo-parathecium of bark cells separated by strands of hyphae, forming dark brown lips, 16–20 μ thick and 50 μ long, covering the margin of the thecium and sometimes represented by a brown line up to 8 μ thick under only a part of the hypothecium, otherwise indistinguishable from the rest of the bark cells; hypothecium 15 μ thick, of very slender, closely woven hyphae; thecium 110 μ tall, 375 μ broad; paraphyses slender, once or twice dichotomous, tips not thickened but partly covered by minute, brownish crystals in the brownish epithecial gel, 8–10 μ thick; asci monosporous, ellipsoid, 80 × 24 μ, thick-walled when young; ascospores brown, muriform, about 72 × 19 μ, at least 20-locular, 10-locellate.

The almost complete lack of parathecium and the dichotomous branching of the tips of the paraphyses are very unusual in *Phaeographina,* but the affinities of this species are clearly with this genus rather than with the Arthoniaceae (lack of parathecium) or with the Opegraphaceae (branched and anastomosing paraphyses forming a thick epithecium).

PHAEOGRAPHINA **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on branch of *Peltophorum africanum* v. *speciosum*, F. C. Deighton M4338.

Thallus epiphloeodes, 40–55 μ crassitudine, olivaceo-alutaceus; cortex 25–40 μ crassitudine, hyphis periclinalibus gelifactis, exteris brunneis; stratum algarum ca. 15 μ crassitudine, filamentis verticalibus *Trentepohliae* 6 μ diametro. Lirellae curvatae flexuosaeve, furcatae aut radiatim ramosae, 3–6 $\times$ 0.2–0.5 mm., labiis thallinis conniventibus, elevatis, mox delapsis, discum pruinosum exponentibus, thallo aequantem; parathecium 15 μ crassitudine, superne nigrum, inferne fulvum, integrum; hypothecium 10 μ crassitudine, hyphis tenuibus dense contextum; thecium 95 μ altitudine, 150 μ latitudine; paraphyses tenues; asci monospori, 70 $\times$ 18 μ, juventute pachydermei; ascosporae brunneae, murales, ellipsoideae, 20-loculares, 5–6-locellatae, 72–95 $\times$ 21–24 μ.

Thallus epiphloeodal, 40–55 μ thick, olive buff or darker depending on the color of the underlying bark; cortex 25–40 μ thick, of slender, gelified, periclinal hyphae, the outer 10 μ brownish; algal layer 15 μ thick, of vertical filaments of *Trentepohlia* about 6 μ in diameter; medulla not differentiated, the algal layer resting on the bark cells. Lirellae curved, flexuous, forked or radiately branched, 3–6 $\times$ 0.2–0.5 mm., covered by elevated, connivent thalline lips at first, which crack off exposing the pruinose disc level with the thallus; parathecium 15 μ thick, black above, fading to tawny in the lower half, entire; hypothecium 10 μ thick, of deeply staining, slender, densely woven hyphae; thecium 95 μ high, 150 μ wide; paraphyses slender, upper 10 μ slightly brownish; asci monosporous, 70 $\times$ 18 μ, thick-walled at first; ascospores brown, muriform, ellipsoid, about 20-locular and 5–6-locellate, 72–95 $\times$ 21–24 μ while still brown, shrinking to 55–69 $\times$ 15 μ, and subfusiform when very dark brown.

PHAEOGRAPHINA **leucophora** Dodge, comb. nov.
Lecanactis leucophora Nyl., Flora 69:176. 1886.

PHAEOGRAPHINA **scriptitata** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on branches of *Citrus aurantifolia*. F. C. Deighton M4628.

Thallus epiphloeodes, 90–100 μ crassitudine, cartilagineus, alutaceo-olivaceus; cortex 40–50 μ crassitudine, gelifactus, hyphis periclinalibus septatis 3 μ diametro, strato algarum discontinuo usque ad 30 μ crassitudine, cellulis *Trentepohliae*? 10–11 μ diametro tectus; stratum algarum verum 40 μ crassitudine, filamentis verticalibus *Trentepohliae* 6–8 μ diametro. Lirellae elongatae flexuosaeque, 5 $\times$ 0.5 mm. aut ramosae, subdendroideae, immersae aut subimmersae, disco subconcavo, caesio-pruinoso, madefacto livido, siccitate thecio ab labiis circumscisso; parathecium 55 μ crassitudine, integrum, pallide brunneum; hypothecium vix evolutum; thecium 120 μ altitudine; paraphyses tenues, apicibus non incrassatis, granulis brunneis tectis; asci ellipsoidei aut fusiformes, stipite 15 μ longitudine,

115 × 22 μ; ascosporae octonae, imbricatim distichae, brunneae, murales, ellipsoideae, 8-loculares, 3-locellatae, protoplastis rotundatis, 29–32 × 12–13 μ.

Thallus epiphloeodal, 90–100 μ thick, cartilaginous, buffy olive; cortex 40–50 μ thick, gelified, of periclinal, septate hyphae about 3 μ in diameter, covered by a discontinuous algal layer of variable thickness, up to 30 μ thick, of disorganized *Trentepohlia* filaments 10–11 μ in diameter; true algal layer 40 μ thick, of vertical filaments of *Trentepohlia* 6–8 μ in diameter, resting on the bark cells, with occasional filaments penetrating much deeper into the bark. Lirellae immersed or very slightly elevated, long-flexuous, 5 × 0.5 mm., or variously branched, subdendroid, closely aggregated, disc soon exposed, slightly concave and densely chalky-pruinose, livid when moistened, thecium tending to crack away from the lips when dry; parathecium 55 μ thick, entire, pale brownish; hypothecium scarcely differentiated; thecium 120 μ tall; paraphyses slender, tips not thickened, covered with brownish granules in the upper 10 μ; asci 8-spored, ellipsoid to fusiform, stipe about 15 μ long, 115 × 22 μ; ascospores imbricately monostichous, brown, muriform, ellipsoid, mostly 8-locular, 3-locellate, protoplasts rounded, sometimes slightly constricted at the septa when mature, 29–32 × 12–13 μ.

The interpretation of this species is difficult. If the outer algal layer represents purely epiphytic growths, it is strange that the algae should be so uniform. The cells are larger and the walls thicker than those of the *Trentepohlia* filaments in the true algal layer, but they have the usual color of *Trentepohlia*. There are also somewhat irregular blackened masses in the parathecium and rarely also below the thecium, but they are apparently adventitious in contrast to the regularly darkened upper portion of the parathecium in *P. caesiopruinosa*. *P. scriptitata* seems closest to *P. mozambica* (Vainio) Zahlbr., from which it differs in its somewhat darker thallus, shorter, more curved and branched lirellae, more brownish parathecium which does not extend above the thecium, much broader disc, and its more septate spores.

PHAEOGRAPHINA DEDUCTA Zahlbr., Cat. Lich. Univ. 2:437. 1923.

Lecanactis Montagnei subsp. *deducta* Nyl., Flora 69:176. 1886.
Lecanactis Montagnei subsp. *deducens* Nyl., Lich. Insul Guineens. 32. 1889 (*lapsus calami?*, repeating the description verbatim).
Graphis deducta Vainio, Cat. Welwitsch Afric. Pl. 2:436. 1901.

Type: *Lecanactis Montagnei* subsp. *deducta* Nyl. was based on São Thomé, Rodia, 550 m., Monte Cafe, Saudade, 700 m., A. Moller, comm. J. Henriques, and subsp. *deducens* Nyl. on São Thomé, 550–700 m., corticole, Moller.

Thallus epiphloeodal, 70 μ thick, olivaceus black; cortex 30 μ thick, of highly gelified periclinal hyphae; algal layer 40 μ thick, of rather disorganized, vertical filaments of *Trentepohlia* 5–8 μ in diameter, tending to die off below, leaving lacunae between the hyphae but no medulla differentiated. Lirellae circular, about 1 mm. in diameter, to elongate, flexuous or lobulate, very rarely branched, 5–6 × 1 mm., elevated and somewhat constricted at the base; amphithecium prominent,

slightly inflexed, lips spreading, disc open, not pruinose, claret brown; parathecium entire, carbonaceous, about 100 μ thick above to 125–150 μ thick at the angled base, vertical or slightly spreading, 125 μ thick below the hypothecium which is scarcely differentiated; thecium 135 μ tall; paraphyses slender with abundant oil droplets, with flexuous, deeply staining hyphae about 3 μ in diameter (resembling latex vessels of the Autobasidiomycetes) which apparently produce the amorphous red covering of the thecium; asci clavate with stipes 15 μ long, thick-walled and 4-spored when young, only maturing a single spore; ascospores brown, muriform, 24-locular, 5-locellate, 80–100 $\times$ 22 μ.

Probably Nylander had only a portion of a thallus with the circular lirellae, when superficially it would look like a large *Haematomma,* while its microscopic structures would place it in his *Lecanactis*, since Nylander seldom used spore septation as a generic character.

After the ascospores are shed, the thecium quickly begins to disintegrate and is covered by thalline cortex and eventually some thalline algae. Later a new lirella forms on the base of the old parathecium. In contrast to most Graphidaceae where this occurs, only a part of the old parathecium is occupied, so that we may have 3–4 new lirellae along an old one, sometimes with the long axis parallel to that of the old one, sometimes nearly transverse.

Fernando Po Island: Izaguirre estate near Botonos, 550 m., on *Theobroma,* C. A. Thorold 167.

PHAEOGRAPHINA **leptotremoides** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on bark of *Bauhinia tomentosa,* F. C. Deighton M4307.

Thallus epiphloeodes, superficie laevi, opaca, albidus, 40 μ crassitudine; cortex 10 μ crassitudine, hyphis periclinalibus gelifactis; stratum algarum 30 μ crassitudine, filamentis periclinalibus *Trentepohliae* 5–6 μ diametro; medulla non bene evoluta, vicinitate parathecii excepta ubi hyphae tenues crystallos magnos includunt, ut in *Leptotremate.* Lirellae emersae, usque ad 2.5 $\times$ 0.3 mm., basi subconstrictae, labiis conniventibus, ter profunde sulcatae, nigrae, rectae vel curvatae, rare furcatae; parathecium dimidiatum, ad labias 15 μ crassitudine, in lateribus ad 20 μ dilatatum, obscure brunneum, hyphis periclinalibus; hypothecium 8 μ crassitudine; thecium cordiforme, 60 μ altitudine latitudineque; paraphyses tenues, apicibus non incrassatis; asci ellipsoidei; ascosporae brunneae, muriformes, ca. 10-loculares, 5-locellatae, probabiliter 45–50 $\times$ 15–18 μ, nunc collapsae, 30 $\times$ 11 μ.

Thallus epiphloeodal, surface smooth, dull whitish, 40 μ thick; cortex 10 μ thick, of gelified, periclinal hyphae 5–6 μ in diameter; algal layer 30 μ thick, of periclinal filaments of *Trentepohlia* 5–6 μ in diameter, medulla not differentiated except in the vicinity of the parathecium where the hyphae enclose very large crystals as in *Leptotrema.* Lirellae emersed, up to 2.5 $\times$ 0.3 mm., somewhat constricted at the base, lips connivent, up to thrice deeply sulcate, black, straight or curved, sometimes once dichotomous; parathecium dimidiate, 15 μ thick at the lips, expanding to 20 μ on the sides, very dark brown, of periclinal hyphae; hypothecium about 8 μ thick, resting on the bark cells; thecium cordate, 60 μ tall and

broad; paraphyses slender, tips not thickened; asci monosporous?, ellipsoid; ascospores muriform, brown, at least 10-locular, 5-locellate, probably 45–50 × 15–18 μ, shrinking to 30 × 11 μ.

The youngest lirella sectioned has the sides covered with the thallus; the parathecium has lips up to 30 μ thick, expanding to 55 μ on the sides, with the uppermost bark cells darkened; the thecium is only 45 μ tall and 80 μ broad; the paraphyses are attached at both top and bottom; no asci seen. After the first thecium has disintegrated, a new thecium forms from the old hypothecium and new parathecial walls grow out of the lower inner margins of the old parathecium, spreading the old parathecial lips, leaving a curving space about 20 μ wide extending about halfway down the old parathecium, filled with the gelified remains of the old thecium. This process may be repeated, leaving at least three incurved lips. Sometimes the outermost lips break off and the thallus covers the broken stumps.

The Cameroons lirella sectioned is still in the one-lipped stage, but the thecium has nearly disintegrated. A single brown shrunken ascospore was found in these sections, and one in the old thecium of an early 2-lipped stage from the Sierra Leone material. Probably before the spores shrank, they measured about 45–50 × 15–18 μ, judging from my experience with other species where both mature and shrunken ascospores have been found in the same thecium.

Sierra Leone: Njala (Kori), on bark of *Bauhinia tomentosa,* F. C. Deighton M4307.

Cameroons: Tombel, on *Theobroma,* C. A. Thorold 125.

PHAEOGRAPHINA **alata** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on *Peltophorum africanum* v. *speciosum,* F. C. Deighton M4339.

Thallus epiphloeodes, 40 μ crassitudine, alutaceo-brunneus; ecorticatus; cellulis *Trentepohliae* 7 μ diametro, subellipsoideis; medulla hyphis tenuibus, verticalibus dense contexta. Lirellae emersae, simplices, rare curvatae vel furcatae, 300 μ altitudine, 1–2 × 0.5 mm., dimidiatae, labiis conniventibus; parathecium superne 75 μ crassitudine ad 180 μ in lateribus basique alata usque ad 330 μ dilatatum, carbonaceum, partim strato thallino tenui tectum; hypothecium 6–8 μ crassitudine, hyphis tenuibus dense contextum in strato cellularum suberosarum brunnearum 25 μ crassitudine impositum; thecium rotundatum, 300 μ altitudine, 360 μ latitudine; paraphyses tenues, apicibus non incrassatis, guttulis oleosis superne inspersae; asci clavati dein ellipsoidei, 180 × 32 μ pachydermei, monospori; ascosporae brunneae, muriformes, ad 20-loculares, dein quoque loculo diviso et cellulis irregulariter dispositis, 175 × 30 μ.

Thallus epiphloeodal, 40 μ thick, between buffy brown and citrine drab; ecorticate; cells of *Trentepohlia* about 7 μ in diameter, somewhat ellipsoid, irregularly arranged in the upper part of the thallus; medulla of densely woven, predominantly vertical hyphae. Lirellae emersed, 300 μ tall, 1–2 × 0.5 mm.,

dimidiate, lips connivent, simple, rarely somewhat curved or forked; parathecium 75 μ thick above, expanding to 180 μ on the sides and extending 330 μ beyond the thecium at the base, carbonaceous, covered on the lower two thirds by a thin decomposed layer of thallus; hypothecium 6–8 μ thick, of densely woven, deeply staining, slender hyphae resting on a layer of bark cells about 25 μ thick, deeper brown than those below; thecium rounded, 300 μ tall, 360 μ broad; paraphyses slender, unbranched, tips not thickened, with oil droplets in the upper portion of the thecium; asci monosporous, clavate at first, walls 5 μ thick, becoming ellipsoid and thin-walled, 180 $\times$ 32 μ; ascospores brown, muriform, about 20-locular at first, then each locule is further divided by septa in all three planes and the protoplasts become quite irregularly arranged, 175 $\times$ 30 μ.

In thick sections, the dark brown bark cells may be mistaken for the base of the parathecium which would then appear entire instead of dimidiate.

Chiodectonaceae

Thallus crustose, homoeomerous or heteromerous, hypothallus often slightly developed, ecorticate or with a slight, almost amorphous cortex; algae *Trentepohlia* or *Phycopeltis*. Lirellae in stromata usually immersed, rounded or elongate, simple or branched; parathecium black or hyaline; paraphyses simple or branched and anastomosing; ascospores septate or muriform, protoplasts cylindric or rounded; spermatia exobasidial.

The family as now constituted included all the stromatic lichens related to the Opegraphaceae and Graphidaceae. Here we have the same problems we have in the relationships of the Pyrenulaceae and Trypetheliaceae, although there are not so many intermediate species. *Ptychographa* Nyl. and *Diplogramma* Müll. Arg. perhaps should belong with this family as they have 2–4 parallel thecia immersed in a sort of stroma. The stroma with its immersed lirella is often called a sarcothecium.

1. Corticole, rarely saxicole, with *Trentepohlia* algae 2
1. Foliicole, with *Phycopeltis* algae 10
   2. Paraphyses simple, free 3
   2. Paraphyses branched and anastomosing 7
3. Ascospores with rounded to lenticular protoplasts 4
3. Ascospores with cylindric protoplasts and thin septa; muriform ..... *Enterodictyon* Müll. Arg.
   4. Ascospores septate 5
   4. Ascospores muriform 6
5. Ascospores hyaline ..... *Glyphis* Ach.
5. Ascospores brown ..... *Sarcographa* Fée
   6. Ascospores hyaline ..... *Medusulina* Müll. Arg.
   6. Ascospores brown ..... *Sarcographina* Müll. Arg.
7. Ascospores septate 8
7. Ascospores muriform 9
   8. Ascospores hyaline ..... *Chiodecton* Ach.
   8. Ascospores brown ..... *Sclerophyton* Eschw.
9. Ascospores hyaline ..... *Minksia* Müll. Arg.
9. Ascospores brown ..... *Enterostigma* Müll. Arg.
   10. Paraphyses unbranched and free ..... *Pycnographa* Müll. Arg.
   10. Paraphyses branched and anastomosing ..... *Mazosia* Mass.

GLYPHIS

GLYPHIS Ach., Syn. Lich. 107. 1814.

Graphis subg. *Scolaecospora* sect. *Glyphis* Vainio, Etude Lich. Brésil 2:127. 1890.

Type: not designated. *G. cicatricosa* Ach. may be chosen to conserve the name in its present use, as *G. labyrinthica* and *G. tricosa* have been transferred to *Sarcographa.*

Thallus crustose, epi- or endophloeodal, ecorticate or with an almost amorphous cortex of periclinal hyphae; algae *Trentepohlia.* Lirellae immersed to subsessile on a black stroma, elongate, branched or somewhat rounded; parathecium black with entire lips, disc flat; hypothecium hyaline; paraphyses unbranched, free; asci clavate with thickened tips, 4–8-spored; ascospores ellipsoid to fusiform, septate, with lenticular protoplasts, hyaline.

Ascospores 27–30 × 8 μ, 8-locular; sarcothecia 3 mm. in diameter; Guinea.....*G. cicatrosa* Ach.
Ascospores 40–52 × 10 μ, 8–10-locular; sarcothecia up to 8 × 5.5 mm.; Mozambique.....
.....*G. latissima* (Vainio) Zahlbr.

GLYPHIS CICATRICOSA Ach., Syn. Lich. 107. 1814.

Graphis cicatricosa Vainio, Etude Lich. Brésil 2:127. 1890.

Type: Guinea, on *Cordaria acutifolia* Afz. (*Dialia guineensis* Willd.) Afzelius.

Thallus mostly hypophloeodal, buffy brown, black-margined, at least next the thalli of other lichens; cortex gelified, about 25 μ thick, of periclinal hyphae; filaments of *Trentepohlia,* 5–6 μ in diameter, mostly between the bark cells. Sarcothecia circular, subcrenate, up to 3 mm. in diameter in our material, margin ashy, narrow, very slightly elevated, lirellae radiately dendroid-branched and lobulate, disc flat to slightly concave, brown, lips thin, spreading, black; stroma carbonaceous, about 115 μ thick; in the younger portions cortex of vertical brownish hyphae covered with minute granules which disappear in the older portions; parathecium about 15 μ thick, usually concrescent with the stroma in the older portions; hypothecium about 15 μ thick, of densely woven, deeply staining hyphae; thecium 80 μ tall; paraphyses slender, tips pyriform and brownish, about 8 × 3 μ; asci clavate, 8-spored, thick-walled when young, about 67 × 19 μ; ascospores imbricately monostichous, somewhat twisted, hyaline, fusiform, thick-walled, 8-locular, protoplasts rounded, 27–30 × 8 μ.

Sierra Leone: Njala (Kori), on *Bauhinia tomentosa,* F. C. Deighton M4307D; M4307G.

Var. **pulvinata** Dodge, var. nov.

Type: Sierra Leone, Njala (Kori), on *Peltophorum africanum* var. *speciosum,* F. C. Deighton M4343.

Thallus epiphloeodes, 65 μ crassitudine, olivaceo-brunneus; cortex 25 μ crassitudine, hyphis tenuibus periclinalibus gelifactis; stratum algarum 40 μ crassitudine, filamentis verticalibus *Trentepohliae;* sarcothecia pulvinata, basi subconstricta,

orbicularia, 1–1.5 mm. diametro, 0.33 mm. altitudine; stroma 220–250 μ crassitudine sub theciis; parathecium 8 μ crassitudine; ascosporae 8-loculares, uno apice obtuso, altero acuto, 32 $\times$ 8 μ.

Thallus 65 μ thick, epiphloeodal, olive brown; cortex 25 μ thick, of gelified, periclinal, slender hyphae; algal layer 40 μ thick, of subvertical filaments of *Trentepohlia* above the bark cells; sarcothecia pulvinate, slightly constricted at the base, circular, 1–1.5 mm. in diameter, 0.33 mm. tall; stroma 220–250 μ thick below the thecia; parathecium 8 μ thick; ascospores 8-locular, one end obtuse, the other acute, 32 $\times$ 8 μ.

SARCOGRAPHA

SARCOGRAPHA Fée, Essai Crypt. Ecorces Officin. xxxv, 38. 1824.

Asterisca Meyer, Nebenstudien, 331. 1825.
Actinoglyphis Mont., Syll. Gen. Sp. Crypt. 355. 1856.

Type: not designated; S. *Cascarillae*, S. *Cinchonarum* and S. *tigrina* were described. *Asterisca* Meyer was based on *Glyphis labyrinthica* Ach. and *G. tricosa* Ach. *Actinoglyphis* Mont. was based on *A. Leprieurii* Mont.

Thallus crustose, epi- or endophloeodal, ecorticate or with an almost amorphous cortex of periclinal hyphae; algae *Trentepohlia*. Sarcothecia carbonaceous in sect. *Eusarcographa* or hyaline in sect. *Phaeoglyphis;* parathecium well developed and carbonaceous to rudimentary; lirellae usually branched; paraphyses unbranched, free; asci clavate with thickened tips; ascospores brown, septate with lenticular protoplasts.

Stroma dark brown; parathecium carbonaceous; ascospores 14–20 $\times$ 6–8 μ, 4–6(–8)-locular; Guinea ..... *S. labyrinthica* (Ach.) Müll. Arg.
Stroma pale brownish; parathecium pale; ascospores 18–19 $\times$ 5–6 μ, 4-locular; Fernando Po ..... *S. Thoroldi* Dodge

SARCOGRAPHA LABYRINTHICA Müll. Arg., Mém. Soc. Phys. Hist. Nat. Genève 29:8:62. 1887.

Glyphis labyrinthica Ach., Syn. Lich. 107. 1814.
Asterisca labyrinthica Meyer, Nebenstudien, 161. 1825.
Graphis labyrinthica Vainio, Cat. Welwitsch Afric. Pl. 2:439. 1901.

Type: Guinea, corticole, Afzelius.

Thallus epiphloeodal, about 80 μ thick, deep olive buff to citrine drab; cortex 40 μ thick, gelified, of densely woven, mostly periclinal hyphae; algal layer 40 μ thick, of somewhat disorganized, vertical filaments of *Trentepohlia* 5–6 μ in diameter. Sarcothecia rounded, up to 4 mm. in diameter, then coalesced into much larger, irregular areas, white-pruinose; lirellae labyrinthiform, very narrow, open, disc pruinose, the thecium shrinking and cracking away from one side of the parathecium when dry, giving the appearance of minute, partly connivent lips, but the disc level with the top of the parathecium when moist and no cracks visible; parathecium entire, fuscous above, dark fuscous to carbonaceous below,

8 μ thick above to 15 μ below, immersed in the stroma of lighter brown pseudoparenchyma; hypothecium not well differentiated, of closely packed, vertical septate hyphae, somewhat more deeply staining in the lower 25 μ of the thecium; thecium 100 μ tall; paraphyses slender, tips thickened and brown in the upper 8 μ; asci cylindric-clavate, thick-walled when young, 60 $\times$ 12–13 μ, 8-spored; ascospores imbricately monostichous to subdistichous, oblong-ellipsoid, brownish, 4–6(–8)-locular, protoplasts rounded, 14–20 $\times$ 6–8 μ.

Sierra Leone: Njala (Kori), on *Peltophorum africanum* v. *speciosum*, F. C. Deighton M4336, on *Anisophyllea laurina*, F. C. Deighton M4403, and on *Citrus aurantifolia*, F. C. Deighton M4424, M4626.

Nigeria: Ehor near Benin City, on *Theobroma*, C. A. Thorold 123.

Cameroons: Tombel, on *Theobroma*, C. A. Thorold 122, 136.

Sarcographa (Phaeoglyphis) **Thoroldi** Dodge, sp. nov.

Type: Fernando Po, Izaguirre estate, 550 m., near Botonos, on *Theobroma*, C. A. Thorold 166.

Thallus epiphloeodes, 70–80 μ crassitudine, obscure olivaceo-griseus; cortex gelifactus, 15 μ crassitudine, hyphis periclinalibus; stratum algarum 55–65 μ crassitudine, filamentis *Trentepohliae* subverticalibus laxe dispositis, 4–5 μ diametro. Sarcothecia rotundata, usque ad 5 mm. diametro, in gregibus irregularibus confluentia, 2.5 $\times$ 1 cm.; stroma pallide brunnea, 130–160 μ crassitudine; parathecium superne 20 μ crassitudine, inferne ad 40 μ dilatatum, pseudoparenchymate leptodermeo, sub hypothecio 20 μ crassitudine, hyphis periclinalibus pallide brunneis; hypothecium 25 μ crassitudine, hyphis subverticalibus dense contextum; thecium 95 μ altitudine; paraphyses tenues, apicibus incrassatis brunneis, epithecium 8 μ crassitudine formantes; asci juventute pachydermei, cylindrico-clavati, 65 $\times$ 8 μ; ascosporae octonae, submonostichae, brunneae, oblongae, 4-loculares, protoplastis rotundatis, 18–19 $\times$ 5–6 μ.

Thallus epiphloeodal, 70–80 μ thick, dark grayish olive; cortex 15 μ thick, gelified, of periclinal hyphae; algal layer 55–65 μ thick, of loosely arranged, subvertical filaments of *Trentepohlia* 4–5 μ in diameter, some filaments penetrating deeper between the bark cells. Sarcothecia rounded, up to 5 mm. in diameter, confluent into irregular areas up to 2.5 $\times$ 1 cm., stroma pale brownish, about 130–160 μ thick; parathecium 20 μ thick above to 40 μ below, of thin-walled pseudoparenchyma, 20 μ thick below the hypothecium, of periclinal light brown hyphae; hypothecium 25 μ thick, of densely woven, deeply staining, subvertical hyphae; thecium 95 μ tall; paraphyses slender, tips slightly enlarged and brownish, forming an epithecium 8 μ thick; asci thick-walled when young, 8-spored, cylindric-clavate, 65 $\times$ 8 μ; ascospores submonostichous, brownish, oblong, 4-locular, protoplasts rounded, 18–19 $\times$ 5–6 μ.

CHIODECTON

CHIODECTON Ach., Syn. Lich. 108. 1814.

Hypochnus Ehrenb. in Nees, Horae Phys. Berol. 84. 1820, *non* Fr. 1818.
Syncesia Tayl. in Mackay, Fl. Hibern. 2:103. 1836.
Melanodecton Mass., Atti I. R. Ist. Veneto III, 5:324. 1860.

Type: not designated. *C. sphaerale* and *C. seriale* described, both in subg. *Euchiodecton*. *Hypochnus* Ehrenb. was based on *H. rubrocinctus* Ehrenb., a synonym of *C. sanguineum* (Sw.) Vainio in subg. *Byssophorum*. *Syncesia* was based on *S. albida* Taylor, usually included in subg. *Euchiodecton*. *Melanodecton* Mass. was based on *Chiodecton sphaerale* Ach. and *M. indicum* Mass. Since the subgenus *Enterographa* (Fée) Müll. Arg. with hyaline stromata and parathecia is often recognized as a separate genus, I have not included its synonymy here, as none of the names would displace those listed above if the genus were to be divided.

Thallus epiphloeodal (sometimes epilithic in subg. *Enterographa*); ecorticate; algae *Trentepohlia*. Sarcothecia with immersed or sessile lirellae which may be rounded or elongate; parathecium carbonaceous, well developed, greatly thickened below to thin and rudimentary above, hyaline below (in subg. *Enterographa*); paraphyses branched and anastomosing; ascospores fusiform to acicular, hyaline, septate with cylindric protoplasts.

1. True stromata without algae; the bases of parathecia very thick, usually confluent below; subg. EUCHIODECTON 2
1. Pseudostromata with algae, containing several thecia; often sterile; thallus of very loosely woven hyphae and filaments of *Trentepohlia*, margin byssoid, wide, usually of a different color from the rest of the thallus; subg. BYSSOPHORUM 10
2. Ascospores 4-locular 3
2. Ascospores 4–6-locular, 22–35 μ long; disc 0.8–1.3 mm., pruinose; sarcothecia poorly developed; Mozambique ..... *C. rotundatum* Vainio
2. Ascospores 6–8-locular 8
2. Ascospores 10–12-locular 9
3. Ascospores more than 5.5 μ broad; thallus white 4
3. Ascospores not over 4 μ broad 5
4. Ascospores 23–26 $\times$ 5.5–6.5 μ; Socotra ..... *C. socotranum* Müll. Arg.
4. Ascospores 30–35 $\times$ 6–7 μ; Mozambique ..... *C. amyloplacoides* Vainio
5. Ascospores 26–30 $\times$ 3–4 μ 6
5. Ascospores 39–44 $\times$ 3–4 μ; sarcothecia 1–2.5 $\times$ 0.8–1.5 mm., disc blackening; Mozambique ..... *C. palmensis* Vainio
6. Thallus with loose byssine margin; sarcothecia 2.5–4 $\times$ 0.9–1.5 mm., disc ashy-pruinose; Mozambique ..... *C. laceratum* Vainio
6. Thallus margin inconspicuous or partly dark 7
7. Sarcothecia circular to oblong, 1 mm. broad; disc 50–100 μ in diameter; ascospores 26–30 $\times$ 3–4 μ; Kenya ..... *C. minutulum* Müll. Arg.
7. Sarcothecia oblong to irregular, 0.8–2 $\times$ 0.8–1.5 mm.; ascospores 30 $\times$ 2–4 μ; Mozambique ..... *C. mozambicum* Vainio
8. Ascospores 21–24 $\times$ 5 μ; disc 20–50 μ in diameter; sarcothecia 0.2 mm.; Socotra ..... *C. nanum* Müll. Arg.
8. Ascospores 28–44 $\times$ 3–4 μ; disc 80–100 μ; sarcothecia 0.4–2 mm.; Kenya ..... *C. irregulare* Zahlbr.
9. Ascospores 36 $\times$ 5 μ; disc 160–250 μ; Socotra ..... *C. circumscissum* Müll. Arg.
9. Ascospores 34–40 $\times$ 2.5–4 μ; disc 300–600 μ; Angola ..... *C. amyloplacum* Vainio
10. Thallus white; sterile 11
10. Thallus glaucous or yellowish; fertile 12

11. Thallus easily separating from the substrate, white above, yellow below, margin somewhat tawny; Usambara ..... *C. hypochryseum* Müll. Arg.
11. Thallus not easily separating, covered with white isidioid soredia, white below, margin white; Sierra Leone ..... *C. album* Dodge
12. Ascospores 4-locular, 45–50 × 4.5–5 μ 13
12. Ascospores 8-locular, 70–80 × 3.5–4 μ; thallus glaucescent, black below, surface isidiose; many minute rounded lirellae per sarcothecium; Usambara ..... *C. Brunnthaleri* Zahlbr.
13. Thallus thin, pale green to ashy; lirellae forked or branched, many per sarcothecium; Usambara ..... *C. intercedens* Müll. Arg.
13. Thallus thick, pale yellow; lirellae rounded, few per sarcothecium; Usambara.... *C. molle* Müll. Arg.

Chiodecton (Byssophorum) **album** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on trunk of *Phyllanthus discoideus*, F. C. Deighton M4396.

Thallus albus, byssinus, margine radiato-fibrilloso, minutis sorediis isidioideis tectus, 25–50 μ crassitudine; ecorticatus; filamentis *Trentepohliae* 11 μ diametro, cellulis 15 μ longitudine et hyphis tenuibus ramosis laxe intertextis cum crystallis usque ad 3 μ diametro. Sterilis.

Thallus white, byssine, margin radiately fibrillose, covered with minute white isidioid soredia, 25–50 μ thick; ecorticate; filaments of *Trentepohlia* mostly between the bark cells with an occasional branch pushing up through the thallus and forming the soredia, about 11 μ in diameter, cells 15 μ long; the rest of the thallus of slender, branched and intricately but loosely tangled hyphae 1.5 μ in diameter, enclosing abundant hyaline crystals up to 3 μ in diameter. Sterile.

The habit is similar to *Chiodecton (Byssophorum) sanguineum* (Sw.) Vainio, but rather thinner, more sorediose and containing hyaline instead of red crystals. As it is sterile, the systematic position of this species is uncertain, since sometimes Cryptotheciaceae have somewhat similar thalli but usually are more closely woven and clearer differentiation of algal layer and medulla.

Lecanactidaceae

Thallus crustose, attached to the substrate by hyphae of the medulla; ecorticate; algae *Trentepohlia*. Apothecia round or nearly so, innate or sessile; amphithecium present or absent; parathecium well developed or rudimentary; paraphyses branched and anastomosing; asci 8-spored; ascospores unilocular, septate or dwarf-muriform.

Although placed in the Cyclocarpineae by Zahlbruckner, this family shows much closer relationships with the Arthoniaceae and Opegraphaceae, differing from the former by the presence of at least a rudimentary parathecium and from the latter by more-rounded apothecia.

1. Parathecium well developed, entire; ascospores hyaline 2
1. Parathecium rudimentary 3
2. Ascospores unilocular ..... *Pseudolecanactis* Zahlbr.
2. Ascospores bilocular, ellipsoidal ..... *Catinaria* Vainio
2. Ascospores 4–16-locular, fusiform to acicular ..... *Lecanactis* Eschw.
3. Amphithecium present; ascospores septate ..... *Schismatomma* Mass.
3. Amphithecium absent; ascospores septate or dwarf muriform ..... *Melampidium* Stirton

LECANACTIS

LECANACTIS Eschw., Syst. Lich. 14. 1824; Fries, Syst. Orb. Veg. 274. 1825.

Type: based on *Opegrapha astroidea* Smith & Sow., *non* Ach., and *Lichen lynceus* Smith & Sow. Eschweiler also figures *L. lobata* Eschw. None of these species are now included in *Lecanactis*, as their apothecia are elongate. Fries added *Opegrapha illecebrosa* Duf., which now is considered a synonym of *L. amylacea* (Ehrh.) Arn. Hence Fries' usage, based on *Opegrapha illecebrosa* Duf., should be conserved.

Thallus crustose, mostly homoeomerous, attached to the substrate by medullary hyphae; algae *Trentepohlia*. Apothecia innate to sessile, round, with black, thin parathecium; paraphyses branched and anastomosing, forming a thick epithecium; asci 8-spored; ascospores fusiform to acicular, septate, protoplasts cylindric. Spermogonia spherical, upper half of wall dark; spermatia exobasidial, ellipsoid to cylindric.

1. Disc black; ascospores 17–21(–24) × 3.5 μ, (4–)6–8-locular; apothecia 1 mm. in diameter; Sierra Leone ..... *L. Deightoni* Dodge
1. Disc yellow-pruinose 2
   2. Ascospores 20–26 × 4–6 μ, 7–10-locular; apothecia 0.6–1 mm. in diameter; Mozambique ..... *L. flavescens* Vainio
   2. Ascospores 15–16 × 4–5 μ, 4-locular; apothecia 0.4–0.6 mm. in diameter; Angola ..... *L. flava* Vainio

LECANACTIS **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on *Cathormion Dinklagei*, F. C. Deighton M3734.

Thallus hypophloeodes, cortex 18–20 μ crassitudine, hyphis tenuibus conglutinatis; stratum algarum 10–15 μ crassitudine super cellulas suberosas, filamentis *Trentepohliae* 5–6 μ diametro, corticem arboris penetrantibus usque ad 140 μ. Apothecia sessilia, basi constricta, rotundata, 1 mm. diametro aut greges ad 3 mm. diametro formantia, margine sicco prominente, nigro; parathecium integrum, 15 μ sub hypothecio superne ad 40 μ, hyphis nigro-brunneis, pachydermeis, periclinalibus; hypothecium subbrunneum, 8 μ crassitudine, hyphis periclinalibus 2 μ diametro; thecium 80 μ altitudine; paraphyses sparsae, tenuissimae, superne dense ramosae anastomosantesque, epithecium nigro-brunneum formantes; asci clavati, 56 × 10 μ; ascosporae octonae, ellipsoideae, rectae vel subcurvatae, (4–)6–8-loculares, protoplastis cylindricis, 17–21(–24) × 3.5 μ.

Thallus mostly hypophloeodal, cortex 18–20 μ thick, of slender, conglutinate hyphae; algal layer 10–15 μ thick above the bark cells, filaments of *Trentepohlia* 5–6 μ in diameter, rather disorganized but penetrating the bark 140 μ deep, separating layers of bark cells and forming cavities filled with contorted filaments. Apothecia sessile, constricted at the base, round, 1 mm. in diameter or forming groups up to 3 mm. in diameter, then distorted by mutual pressure but not coalescent, margin slightly prominent when dry, black both wet and dry; parathecium entire, 15 μ thick below the hypothecium expanding to 40 μ thick around the thecium, of very dark brown, periclinal, thick-walled hyphae; hypothecium

about 8 μ thick, of periclinal, pale brown hyphae about 2 μ in diameter; thecium 80 μ tall; paraphyses sparse, very slender, densely branched and anastomosing above to form the dark brown epithecium 20 μ thick, thecial gel I blue; asci clavate, 8-spored, 56 $\times$ 10 μ; ascospores hyaline, long-ellipsoid, straight or slightly curved, (4–)6–8-locular, walls and septa very thin, protoplasts cylindric, 17–21(–24) $\times$ 3.5 μ.

Thelotremaceae

Thallus crustose, ecorticate or with a more or less amorphous cortex; with *Trentepohlia* or *Phyllactidium* algae, usually with a loosely woven medulla, enclosing large hyaline crystals. Apothecia usually immersed in thalline warts or partly emersed, or several united into a pseudostroma *(Tremotylium)* or proliferating from the margin to form rows of apothecia *(Polystroma)*; amphithecium and parathecium well developed, usually partly covering the thecium and opening by a wide ostiole; thecium entire or pierced by a central columella; paraphyses usually simple and free, rarely branched and anastomosing *(Gyrostomum)*; asci 1–8-spored; ascospores septate or muriform, hyaline or brown.

1. Apothecia proliferating from the margin of the older apothecia, forming more or less erect, forked chains of apothecia.....*Polystroma* Clemente
1. Apothecia united into stromata; paraphyses branched and anastomosing; ascospores muriform, hyaline or brown.....*Tremotylium* Nyl.
1. Apothecia single or somewhat aggregated, but not united into stromata.....2
   2. Corticolous, very rarely saxicolous; algae *Trentepohlia*.....3
   2. Foliicolous; algae *Phyllactidium;* ascospores hyaline.....7
3. Paraphyses branched and anastomosing.....*Gyrostomum* Fr.
3. Paraphyses unbranched.....4
   4. Ascospores septate.....5
   4. Ascospores muriform.....6
5. Ascospores hyaline.....*Ocellularia* Meyer
5. Ascospores brown.....*Phaeotrema* Müll. Arg.
   6. Ascospores hyaline.....*Thelotrema* Ach.
   6. Ascospores brown.....*Leptotrema* Mont. & v. d. Bosch
7. Ascospores septate.....*Phyllophthalmaria* Zahlbr.
7. Ascospores muriform.....*Chroodiscus* Müll. Arg.

TREMOTYLIUM

Tremotylium Nyl., Bull. Soc. Linn. Normandie II, 2:513. 1868.

Type: *T. angolense* Nyl.

Thallus crustose, ecorticate or with an amorphous cortex; algae *Trentepohlia.* Apothecia crowded, forming pseudostromata, each apothecium with its own well-developed parathecium; paraphyses branched and anastomosing; asci 1–8-spored; ascospores hyaline (brown in *T. occultum* Stirton), muriform, protoplasts rounded.

Thallus white; asci 2–8-spored; ascospores 95–170 $\times$ 23–46 μ; Angola.....*T. angolense* Nyl.
Thallus pale ochre; asci 1–3-spored; ascospores 120–160 $\times$ 24–30 μ; Cameroons....*T. africanum* Räs.

Tremotylium africanum Räs., Arch. Soc. Zool. Bot. Fenn. Vanamo 3:185. 1948.

Type: Cameroons, Bipinde, corticole, G. Zenker (anno 1889).

Thallus epiphloeodal, smooth, continuous, pale ochraceous, K reddening. Stromata pulvinate, rounded to somewhat irregular, 1–2 mm. in diameter, about 0.8 mm. tall, containing (1–)2–4(–5) apothecia, discs very concave, 0.2–0.7 mm. in diameter, nude or slightly white-pruinose; parathecium black, entire, 125 μ thick on the sides, thinning to 75 μ thick below the hypothecium; hypothecium thick, I—; paraphyses discrete, branched, slender; asci cylindric, 1–3-spored, I—; ascospores hyaline, muriform, oblong, 120–160 × 24–30 μ, protoplasts spherical.

Our material is very old, having lost its thecia except for a single ascus adhering to the parathecium, showing three ascospores falling within the size range given by Räsänen.

Nigeria: Moor plantation near Ibadan, on *Theobroma,* C. A. Thorold 100, 101.

THELOTREMA

THELOTREMA Ach., Meth. Lich. 130. 1803.

Antrocarpum Meyer, Nebenstudien 326. 1825.

Volvaria Mass., Richerche Autonom. Lich. Crost. 141. 1852, probably not DC. 1805.

Coniochila Mass., Atti I. R. Ist. Veneto III, 5:258. 1860.

Schistostoma Stirton, Proc. Phil. Soc. Glasgow 11:312. 1879.

Type: not designated, but *Lichen lepadinus* would conserve the genus in the sense that it has been used for the last 150 years. *Antrocarpum* Meyer and *Volvaria* Mass. were also based on this species. *Coniochila* Mass. was based on *Thelotrema varioloides* Hampe *nom. nud.,* from Ceylon, not *T. varioloides* (Pers.) Ach. from Europe. From Massalongo's generic description, *T. varioloides* Hampe seems close to (if not identical with) *Schistostoma dehiscens* Stirton from South India, and closely related to *T. schistostomoides* Zahlbr. (*T. schistostoma* Müll. Arg. *non* Tuck.). *Schistostoma* Stirton was based on S. *dehiscens* Stirton.

Thallus epi- or endophloeodal, crustose, ecorticate or with an amorphous cortex; algae *Trentepohlia;* medulla usually loosely woven. Apothecia immersed in the substrate or in thalline warts; parathecium well developed, covering the thecium when young, then rupturing and forming an ostiole; paraphyses simple, unbranched; asci with 8 or fewer ascospores; ascospores hyaline, muriform with rounded protoplasts. Spermatia exobasidial, short-cylindric.

1. Ascospores solitary, 110–114 × 22–35 μ, 34-locular; columella subconic; thallus white, K red; Mozambique ..... *T. turgidulum* Vainio
1. Ascospores 2–4 per ascus, 185 × 22 μ, 42-locular; columella absent; thallus dark olive buff; Cameroons.... ..... *T. cameroonensis* Dodge
1. Ascospores 8 per ascus, under 25 μ long; columella not mentioned..... 2
   2. Thallus olivaceous; ascospores 18–25 × 5–10 μ, 8–10-locular, 2–3-locellate; Angola ..... *T. Pechuelii* Müll. Arg.
   2. Thallus pale yellowish; ascospores 14–25 × 7–9 μ; 4–6-locular; São Thomé..... *T. foratum* Nyl.

Thelotrema (Pseudo-ascidium) **cameroonensis** Dodge, sp. nov.

Type: Cameroons, Banga, on *Theobroma,* C. A. Thorold 141.

Thallus epiphloeodes, 110–120 μ crassitudine, obscure olivaceo-alutaceus; cortex 55 μ crassitudine, hyphis pachydermeis periclinalibus, 5–6 μ diametro, exteris brunneis; stratum algarum 55–65 μ crassitudine, filamentis *Trentepohliae* minutis cum crystallis (rarius magnis) inter hyphas; medulla non evoluta. Apothecia in verrucis thallinis, 1–1.2 mm. diametro, 1 mm. altitudine, ostiolo non papillato; parathecium integrum, 210 μ crassitudine superne, ad 40 μ sub hypothecio tenuescens, non alatum, ostiolo 250 μ diametro, areola nigra, 200 μ latitudine circumdatum; hypothecium vix evolutum; thecium 430 μ altitudine; paraphyses tenues, flexuosae, ramosae, apicibus liberis; asci non bene visi; ascosporae binae vel quaternae, hyalinae, muriformes, ca. 42-loculares et 6-locellatae, 185 $\times$ 22 μ.

Thallus epiphloeodal, 110–125 μ thick, dark olive buff; cortex 55 μ thick, of thick-walled, periclinal hyphae 5–6 μ in diameter, the outer ones brownish; algal layer 55–65 μ thick, of filaments of *Trentepohlia* 6–7 μ in diameter, with many minute crystals and occasional larger ones; medulla not differentiated. Apothecia in thalline warts, 1–1.2 mm. in diameter, 1 mm. tall, ostiole not papillate, about 250 μ in diameter; parathecium exposed as a black area 200 μ wide around the ostiole, in turn surrounded by a paler area of about the same extent; parathecium carbonaceous, entire, 210 μ thick above, thinning to 40 μ below the hypothecium, not winged at the base, resting on the cork cells of the bark; hypothecium scarcely differentiated; thecium 430 μ tall; paraphyses slender, flexuous, branched, tips free in the thecial gel; asci not clearly seen, ascospores in pairs or fours in the thecial gel; ascospores hyaline, muriform, about 42-locular, 6-locellate, 185 $\times$ 22 μ.

Occasionally there are two confluent thalline warts with two ostioles but the apothecia are not crowded as in sect. *Tremotylopsis* Zahlbr.

OCELLULARIA

Ocellularia Meyer, Nebenstudien 327. 1825.

Thelotrema subg. *Ocellularia* Vainio, Etude Lich. Brésil 2:262. 1890.
Ascidium Fée, Essai Crypt. Ecorces Officin. xlii, 96. 1824.
Ocellularia sect. *Ascidium* Müll. Arg., Flora 64:525. 1881.
Myriotrema Fée, Essai Crypt. Ecorces Officin. xlix, 103. 1824.
Ocellularia sect. *Myriotrema* Zahlbr. in Engler & Prantl, Die Nat. Pflanzenfam. I. 1*:118. 1905.
Stegobolus Mont. in Hooker's London Jour. Bot. 4:4. 1845.
Ectolechia Mass., Alcuni Gen. Lich. 10. 1853, *non* Trev. 1853.
Brassia Mass., Atti I. R. Ist. Veneto III, 5:259. 1860.
Coscinedia Mass., Atti I. R. Ist. Veneto III, 5:256. 1860.
Chapsa Mass., Atti I. R. Ist. Veneto III, 5:257. 1860.
Ocellis Clements, Gen. Fung. 80. 1909.

Type: not designated. Two species were transferred from *Thelotrema* (*T. obturatum* and *T. urceolare*, both now in *Ocellularia*) and six from *Pyrenula,* all of which belong in *Pyrenula* as now used). *Ascidium* Fée was based on *A.*

Cinchonarum Fée. *Myriotrema* Fée was based on M. *olivaceum* and M. *album* Fée. *Stegobolus* Mont. was based on S. *Berkeleyanus* Mont. *Ectolechia* Mass. was based on *Ascidium rhodostoma* Mont. *Brassia* Mass. was based on *Thelotrema porinoides* Mont. & v. d. Bosch, now in *Ocellularia*. *Coscinedia* Mass. was based on *Thelotrema microporum* Mont., now in *Ocellularia*. *Chapsa* Mass. was based on *C. indicum* Mass. *Ocellis* Clements was a segregate for species with bilocular ascospores, and was probably based on *Ocellularia myriopora* (Tuck.) Müll. Arg., but the combination was not formally made.

Since *Ascidium* Fée and *Myriotrema* Fée are both older than *Ocellularia*, the last should be conserved, based on *Thelotrema obturata* or *T. urceolare*, in order to avoid a very large number of new combinations. However, it should be without prejudice of *Ascidium* and *Myriotrema*, if a future monographer decides to split the genus. Both names are already in use for very distinct sections of *Ocellularia*.

Thallus crustose, uniform, heteromerous; ecorticate or with an amorphous cortex; algae *Trentepohlia*. Apothecia more or less immersed in substrate or in thalline warts; parathecium and amphithecium covering the thecium when young, then rupturing stellately or forming a circular ostiole, or wholly breaking away above the usually white pruinose thecium; central columella present or absent; paraphyses unbranched; asci 1–8-spored; ascospores septate with lenticular protoplasts, hyaline.

1. Ascospores 4–6-locular 2
1. Ascospores 6–10-locular; thallus ashy, yellowish or fuscous 4
1. Ascospores 16 or more locular 5
   2. Thallus white; columella present in the thecium 3
   2. Thallus glaucous; columella absent; ascospores 6-locular, 45–53 × 11–14 μ; ostiole only 40 μ in diameter; Guinea ..... *O. trypanea* (Ach.) Dodge
   2. Thallus light olive-gray; ascospores 4(–6)-locular, 18–25 × 8–10 μ; ostiole 150 μ in diameter; São Thomé ..... *O. subterebrata* (Nyl.) Zahlbr.
3. Ascospores 4–5-locular, 15–17 × 6 μ; apothecia 0.5–1 mm. in diameter; Sierra Leone ..... *O. discoidea* (Ach.) Müll. Arg.
3. Ascospores 6–10-locular, 17–20 × 6–7 μ; ostiole 0.1–0.2 mm. in diameter; Mozambique ..... *O. mozambica* (Vainio) Zahlbr.
   4. Thallus yellowish, K red, margin indeterminate; ascospores 27–34 × 8–10 μ, 7–9-locular; Kenya ..... *O. Poncinsiana* Hue
   4. Thallus smoky-ashy; columella present; ascospores 20–30 × 7–8 μ, 6–8-locular; Sierra Leone ..... *O. fumosa* (Ach.) Müll. Arg.
   4. Thallus ashy fuscous to greenish; columella not mentioned; ascospores 25–43 × 6–8 μ, 8–10-locular; Sierra Leone ..... *O. cavata* (Ach.) Müll. Arg.
   4. Thallus darker olive; ascospores as in *O. cavata;* apothecia half the size, more depressed with a smaller ostiole, columella not mentioned; Sierra Leone ..... *O. obturata* (Ach.) Sprgl.
5. Ascospores 16-locular, 36–60 × 6–9 μ; thecium 90 μ tall; apothecia 0.5–1 mm.; thallus white; Mozambique ..... *O. albescens* (Vainio) Zahlbr.
5. Ascospores 22–30-locular, 50–60 × 3(–5.5) μ; thecium 135 μ tall; apothecia 0.4 mm.; thallus dark olive buff; Nigeria ..... *O. scolecospora* Dodge

Ocellularia subterebrata Zahlbr., Cat. Lich. Univ. 2:601. 1924.

Thelotrema subterebrata Nyl., Flora 69:174. 1886.

Type: São Thomé, Pico, 1500–2100 m., A. Möller, comm. J. Henriques.

Thallus epiphloeodal, light olive gray, 100 μ thick; cortex 6–8 μ thick, de-

composed; algae periclinal filaments of *Trentepohlia*, 5–6 μ, filling the rest of the thallus, closely packed and partly disorganized, and penetrating the bark at least 65 μ; medulla absent. Apothecia rather crowded but distinct, 0.3–0.4 mm. in diameter, lip elevated about 0.1 mm. above the surface of the thallus, innate, ostiole 150 μ in diameter; parathecium dimidiate, 55–60 μ thick, pale brownish, darker at the lips, of slender, interwoven, periclinal hyphae, nubilated with minute granules; hypothecium 12 μ thick, of conglutinate, interwoven periclinal hyphae; thecium 115 μ tall, 140 μ in diameter; paraphyses slender, not dense, once or twice dichotomous above the asci, tips clavate; asci 8-spored, cylindric, 95 $\times$ 15 μ; ascospores imbricately monostichous, hyaline, 6-locular, protoplasts slightly rounded, 16 $\times$ 5–6 μ.

Our material, described above, has slightly smaller ascospores but as Nylander stated, has the appearance of *O. microspora*. Nylander also stated "subsimilis *T. terebratae*," but it is not clear if this implies the presence of a columella which is lacking in our material.

Sierra Leone: Kenema (Nongowa), on *Copaifera copallifera*, F. C. Deighton M5012.

OCELLULARIA **trypanea** Dodge, comb. nov.

Pyrenula trypanea Ach., Syn. Lich. 119. 1814.
Verrucaria trypanea Sprgl., Syst. Veg. 4:1:244. 1824.

Type: Guinea, corticole, Afzelius.

Thallus epiphloeodal, 135 μ thick, deep sea-foam green; cortex scarcely differentiated, 5–6 μ thick, of two layers of conglutinate, periclinal hyphae; algal layer about 130 μ thick, usually a narrow layer 20 μ thick, nearly separated by a layer of coarse crystals from the main layer 65 μ thick next the bark cells, of more or less vertical filaments of *Trentepohlia* 5–6 μ in diameter. Apothecia crowded, perithecioid, opening by an ostiole about 40 μ in diameter, surrounded by a narrow blackened area, immersed in thalline warts, about 1 mm. in diameter and 0.3 mm. tall; parathecium hyaline (pale yellowish in thick sections), 13–14 μ thick, of conglutinate, periclinal hyphae, surrounded by the algal layer of the thallus; hypothecium 15 μ thick, of slender, densely woven hyphae; thecial gel filling the cavity, paraphyses somewhat dichotomously branched, tips free, not compact; asci clavate, thin-walled when young, 8-spored; ascospores hyaline, fusiform, 6-locular, protoplasts rounded, 45–53 $\times$ 11–14 μ.

The thallus and very thin, hyaline parathecium clearly relate this species to the Thelotremaceae rather than to the Pyrenulaceae, although the habit and cross-section suggest the Pyrenulaceae, especially with the low magnifications available to Acharius. In old apothecia, the thecial gel turns brown, agreeing with Acharius' observation. On the other hand, I have not found the ostiole clearly papillate at any stage as reported by Acharius.

Nigeria: Ondo Province, Erinmo, on *Theobroma*, C. A. Thorold 134.

OCELLULARIA CAVATA Müll. Arg., Flora 65:499. 1882.

Thelotrema cavata Ach., K. Vetensk. Akad. Nya Handl. 33:92. 1812.

Type: Sierra Leone, corticole, Afzelius.

Thallus cartilaginous, verrucose, wrinkled, ashy greenish-fuscous. Apothecia gibberulous, margin of broad ostiole entire, tumid, somewhat verrucose, disc black, covered with a glaucous pruina; parathecium black; ascospores 25–43 × 6–8 μ, (6–)8–10-locular, *fide* Müller Argau.

In our collections, a single thallus may belong here. The thallus agrees in color with Acharius' description (deep olive buff) and is 125–185 μ thick, cortex about 25 μ thick, of thin-walled, conglutinate, mostly periclinal hyphae; algal layer 15 μ thick, continuous, of short filaments of *Trentepohlia,* 5–6 μ in diameter, partly disorganized; medulla 85–145 μ thick, of thick-walled, closely interwoven hyphae, penetrating deeper between blackened cork cells. Apothecia 0.5–0.7 mm. in diameter, 0.3 mm. tall, flattened above and coarsely white-granular, easily mistaken for a member of the *Pertusaria velata* group when the thecium is replaced by soredia. Parathecium about 25 μ thick, hyaline, of large-celled pseudoparenchyma surrounded by a yellow layer 20 μ thick, of disintegrated bark cells and very minute crystals, which is in turn surrounded by a thin layer of thallus. The thecium has disintegrated and been replaced by huge crystals 65 × 25 μ or more. Near the parathecium in a bit of disintegrated thecium, a single ascospore 37 × 8 μ was found with 8 rounded protoplasts, well within the range of size reported by Müller Argau.

Nigeria: Abdo Ekiti near Ondo, on *Theobroma,* C. A. Thorold 139.

OCELLULARIA **scolecospora** Dodge, sp. nov.

Type: Nigeria, Moor plantation near Ibadan, on *Theobroma,* C. A. Thorold 160.

Thallus hypophloeodes, obscure olivaceo-alutaceus, ex isidiis granularibus 15–25 μ diametro; stratum algarum 25 μ crassitudine, 25 μ sub superficie corticis *Theobromatis*, filamentis *Trentepohliae* 5–6 μ diametro, periclinalibus inter cellulas suberosas. Apothecia orbicularia, 150 μ altitudine, 400 μ latitudine, sine columella, non aut parce basi constricta, erumpentia, disco albo-pruinoso; pseudo-amphithecium 25 μ crassitudine, cellulis suberosis, hyphis paucis cellulisque *Trentepohliae;* parathecium 15–25 μ crassitudine, integrum, hyphis pachydermeis, periclinalibus, fuligineis, lateribus verticalibus intus cum cellulis hyalinis magnis laxis; hypothecium vix evolutum; thecium 135 μ altitudine; paraphyses tenues, subdichotome ramosae, rarissime anastomosantes, apicibus non incrassatis, pruina crystallorum tectae; asci fusiformes, 130 × 15 μ; ascosporae octonae, hyalinae, 22(–30)-loculares, protoplastis rotundatis, curvatae vel flexuosae, 50–66 × 3(–5.5) μ.

Thallus hypophloeodal, dark olive buff, from minute granular isidia, 15–25 μ in diameter; algal layer about 25 μ thick, situated about 25 μ below the surface of the bark, filaments of *Trentepohlia,* 5–6 μ in diameter, periclinal between the cork cells, somewhat disorganized, with occasional filaments above and below the main

layer, the lower cork cells blackened, forming a layer 15 μ thick. Apothecia round, 150 μ tall, about 400 μ broad, without a columella, not or slightly constricted at the base, disc densely white-pruinose, carrying a layer of cork cells 25 μ thick, with hyphae and a few algal cells up to the top of the parathecium, thus forming a pseudo-amphithecium; parathecium 15–25 μ thick, entire, of dark fuliginous, periclinal, thick-walled hyphae, appearing carbonaceous in thick sections, inside which is a nearly hyaline layer of very large, loosely packed cells; hypothecium scarcely differentiated; thecium 135 μ tall; paraphyses slender, somewhat dichotomously branched and anastomosing in the thecial gel, tips not thickened, covered with a thick pruina of crystals (which mostly wash away in sectioning and mounting); asci fusiform, about 8-spored, 130 $\times$ 15 μ; ascospores hyaline, fusiform, 22–30-locular, protoplasts rounded, 50–66 $\times$ 3(–5.5) μ, when free from the ascus, breaking apart into short sections of 6–8 cells, flexuous or curved, twisted about each other in the ascus.

Perhaps this species should be taken as the type of a new genus, homologous with *Gyrostomum* Fr. in the series with brown, muriform ascospores. The spore measurements are rather unsatisfactory, as I have been unable to free whole spores from the ascus without breaking them. In the ascus they are so twisted about each other that I have been unable to see both ends at once. In *Thorold 161* and *117*, the ascospores are less twisted in the ascus and measure approximately 50–66 $\times$ 3 μ and are at least 30-septate.

This species differs from *O. albescens* (Vainio) Zahlbr. in lacking a columella, a darker thallus, a taller thecium, and narrower, more septate ascospores.

Nigeria: Moor plantation near Ibadan, C. A. Thorold 160, type; Ina near Ibadan, C. A. Thorold 162; Ondo Province, Owena near Akure, C. A. Thorold 117, 161, 163; Abdo Ekiti, C. A. Thorold 118; Akure, C. A. Thorold 162; all on *Theobroma*.

GYALECTACEAE

Thallus crustose, homoeomerous or heteromerous, usually ecorticate, with *Trentepohlia* or *Phyllactidium* algae. Apothecia immersed to sessile, solitary; amphithecium often present; parathecium hyaline (dark in *Sagiolechia*); asci 8–many-spored; ascospores hyaline, from unicellular to muriform, with thin septa and cylindric protoplasts when septate and cubical protoplasts when muriform.

1. Corticole or saxicole, with *Trentepohlia* algae 2
1. Foliicole with *Phyllactidium* algae 6
2. Asci 6–8-spored 3
2. Asci 12–many-spored 5
3. Parathecium dark, entire ..... *Sagiolechia* Mass.
3. Parathecium hyaline or light-colored, waxy 4
4. Ascospores unicellular ..... *Ionaspis* Th. Fr.
4. Ascospores bilocular ..... *Dimerella* Trev. (*Microphiale* Zahlbr.)
4. Ascospores 4 or more locular ..... *Secoliga* Norm.
4. Ascospores muriform ..... *Gyalecta* Ach.
5. Ascospores bilocular, fusiform ..... *Ramonia* Stzbgr.
5. Ascospores 6–pluri-locular, fusiform to acicular ..... *Pachyphiale* Lönnr.
6. Ascospores bilocular ..... *Lecaniopsis* Zahlbr.
6. Ascospores 4-locular, acicular ..... *Semigyalecta* Vainio

IONASPIS

IONASPIS Th. Fr., Lichenogr. Scand. 1:273. 1871.

Type: not designated, seven species listed, all still included in recent monographs.

Thallus crustose, uniform or effigurate, epi- or endolithic (epiphloeodal in *I. ascidioides*), homoeomerous, algae *Trentepohlia.* Apothecia immersed to adnate; parathecium pale or dark; paraphyses simple or sparingly branched above; asci clavate, 8-spored; ascospores unicellular, hyaline, ellipsoidal with a thin wall. Spermatia short, cylindric, straight.

IONASPIS **ascidioides** Dodge, sp. nov.

Type: Nyasaland, Kasungu Hill, 1100 m., L. J. Brass 17458a′.

Thallus epiphloeodes, minute verrucosus, rimulosus, 150–175 μ crassitudine, albidus, anguste nigro-marginatus; ecorticatus; filamentis *Trentepohliae* 8 μ diametro, dense aggregatis, verticalibus, lacunis sphaericis exceptis, 40–80 μ diametro, crystallis magnis hyalinis impletis; medulla non evoluta. Apothecia 0.5–0.6 mm. diametro, sessilia, basi constricta, margine crasso involuto dein tenuiori et thecio aequante, integro aut verticaliter striolato; discus nigro-brunneus, dense albo-pruinosus; amphithecium 90 μ crassitudine, stratum algarum 40 μ crassitudine, filamentis periclinalibus, stratum interius lacunis, magnis cum crystallis; parathecium integrum, hyalinum, pseudoparenchymaticum, 18–24 μ crassitudine; hypothecium 10 μ crassitudine, hyphis tenuibus; thecium 65 μ altitudine; paraphyses conglutinatae, tenues, dichotome ramosae, apicibus non incrassatis, brunneis; asci clavati dein cylindrici, pachydermei, 55 × 14 μ; ascosporae octonae (an 12nae?), hyalinae, uniloculares (juventute false biloculares), leptodermeae, 8–9 × 6–7 μ.

Thallus epiphloeodal, minutely verrucose, rimulose, 150–175 μ thick, whitish with a very narrow black margin; ecorticate; algae *Trentepohlia,* filaments vertical, closely packed except for more or less spherical lacunae, 40–80 μ in diameter, filled with large hyaline crystals. Apothecia 0.5–0.6 mm. in diameter, constricted at the base, margin thick and inrolled when young, becoming thinner and level with the very dark brown, densely white, pruinose disc, entire, becoming slightly vertically striolate; amphithecium 90 μ thick, of an algal layer 40 μ thick of periclinal filaments, the rest of the lacunae filled with large crystals; parathecium entire, hyaline, of small-celled pseudoparenchyma, 18–24 μ thick; hypothecium 10 μ thick, of slender, deeply staining hyphae; thecium 65 μ tall; paraphyses conglutinate, slender, dichotomous, tips not thickened in the brown epithecial gel; asci clavate-cylindric, thick-walled, tip of protoplast acute to mamillate, 8(–12?)-spored, 55 × 14 μ; ascospores hyaline, unicellular, falsely bilocular when young, wall thin, 8–9 × 6–7 μ.

The thallus and amphithecium with large lacunae filled with very large crystals and the shape of the apothecium suggest a relationship to *Ocellularia* subg. *Ascidium* of the Thelotremaceae, which has quite different ascospores. The algae are clearly filamentous *(Trentepohlia)*, hence exclude this species from *Lecanora.*

I have hesitated to refer this species to *Ionaspis*, which is otherwise saxicolous with immersed apothecia so that the older species were first described in *Lecanora* subg. *Aspicilia*, but the homoeomerous thallus with *Trentepohlia* algae, as well as the spores, seems definitely to belong here, unless one enlarges the concept of the Thelotremaceae to include a new genus with unicellular ascospores. The mature spore is certainly unilocular, although young ascospores have a narrow zone of deeply staining granules across the middle, making them appear falsely bilocular, as one often sees in the Antarctic species of *Lecidea*.

SECOLIGA

Secoliga Norm., Nyt Mag. Naturvidensk. 7:230. 1853.

Cryptolechia Mass., Alcuni Gen. Lich. 13. 1853.
Phialopsis Koerber, Syst. Lich. Germ. 169. 1854.
Bryophagus Nitschke in Arn., Flora 45:38. 1862.
Gyalecta sect. *Secoliga* Tuck., Syn. N. Amer. Lich. 1:218. 1882.

Type: not designated. Of the six species included, *Lichen ruber* Hoffm. may be chosen, as it best fits the generic description. *Phialopsis* Koerb. was also based on this species. *Cryptolechia* Mass. was based on *Lecanora carneolutea* Ach. *Bryophagus* Nitschke was based on *B. Gloeocapsa* Nitschke.

Thallus crustose, uniform, epilithic, growing over mosses, or corticole; ecorticate; algae *Trentepohlia;* medulla loosely woven. Apothecia long immersed in the thallus then becoming sessile; parathecium waxy or horny, light-colored, nude or more usually covered by an amphithecium, disc concave; paraphyses unbranched; asci 8-spored; ascospores fusiform to ellipsoidal, septate with cylindric protoplasts. Spermatia exobasidial, cylindric, straight.

1. Ascospores 6-locular, 16–18 × 3 μ; thallus deep olive buff; apothecia 0.3–0.7 mm. in diameter, disc yellow ochre to clay color; Sierra Leone.....*S. Deightoni* Dodge
1. Ascospores 4–8-locular, 18–30 × 4–5 μ; thallus ashy.....2
   2. Apothecia 0.3–0.5 mm., disc reddish flesh-color; Usambara.....*S. versicolor* Müll. Arg.
   2. Apothecia 0.6–0.8 mm., disc whitish; Angola.....*S. plurilocularis* (Vainio) Dodge

Secoliga **plurilocularis** Dodge, comb. nov.

Gyalecta plurilocularis Vainio, Cat. Welwitsch Afric. Pl. 2:427. 1901.

Secoliga **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on pebbles, F. C. Deighton M4840.

Thallus epilithicus, laevis, partim subrimulosus, 80 μ crassitudine, olivaceo-alutaceus, homoeomerus; filamentis *Trentepohliae* periclinalibus, 7–8 μ diametro. Apothecia sessilia, basi constricta, 0.3–0.7 mm. diametro, disco ochraceo-argillaceo, margine pallidiori; parathecium 65 μ crassitudine, superne ad 40 μ tenuescens, pseudoparenchymate cellulis radiantibus, pachydermeis, 4–6 μ diametro; hypothecium 55 μ crassitudine, brunneum, hyphis tenuibus, 3 μ diametro, periclinalibus, leptodermeis; thecium 65–80 μ altitudine; paraphyses conglutinatae, apicibus non incrassatis, brunneis, subdichotome ramosae super ascos; asci pachydermei, clavati, vel cylindrici, 60 × 16 μ; ascosporae octonae, hyalinae, leptodermeae, fusiformes, 6-loculares, 16–18 × 3 μ.

Thallus epilithic, smooth, partly subrimulose, 80 μ thick, deep olive buff, homoeomerous; algae *Trentepohlia*, filaments mostly periclinal, 7–8 μ in diameter. Apothecia sessile, constricted at the base, 0.3–0.7 mm. in diameter, disc yellow ochre to clay color, margin paler; parathecium 65 μ thick below, thinning to 40 μ above, hyaline, of radiating pseudoparenchyma, thick-walled cells 4–6 μ in diameter; hypothecium 55 μ thick, brownish, of thin-walled, mostly periclinal hyphae 3 μ in diameter; thecium 65–80 μ tall; paraphyses conglutinate, tips not thickened in the brownish epithecial gel, somewhat dichotomous above the asci; asci 8-spored, clavate-cylindric, thick-walled, 60 $\times$ 16 μ; ascospores hyaline, thin-walled, fusiform, 6-locular, 16–18 $\times$ 3 μ.

Coenogoniaceae

Thallus spongy-byssoid, adnate or forming dimidiate, shelving masses; homoeomerous with *Trentepohlia* or *Cladophora*, whose filaments are only partially surrounded by hyphae. Apothecia with pseudoparenchymatous parathecium; asci 8-spored; ascospores hyaline, uni- or bilocular; spermatia exobasidial.

Thallus with *Trentepohlia* ..... *Coenogonium* Ehrenb.
Thallus with *Cladophora*, apothecia unknown ..... *Racodium* Pers.

COENOGONIUM

Coenogonium Ehrenb. in Nees, Horae Phys. Berol. 120. 1820.

Type: *C. Linkii* Ehrenb.

Thallus loosely spongy-byssoid, either adnate or forming dimidiate shelving masses (suggesting a thin species of *Polystictus* in shape but not in texture), homoeomerous with *Trentepohlia* filaments partially covered by a network of hyphae. Apothecia scattered on the upper surface, scutiform, usually with a very short stipe; parathecium of thin-walled pseudoparenchyma; paraphyses unbranched, often with swollen tips; asci clavate, 8-spored; ascospores hyaline, fusiform or long-ellipsoid, 1–2-celled.

Coenogonium **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on trunk of *Phyllanthus discoideus*, F. C. Deighton M4396a.

Thallus tenuissimus, filamentis repentibus *Trentepohliae* 26 μ diametro, cellulis 75 μ longis, cylindricis, hyphis tenuibus, 3 μ diametro, partim corticatis. Apothecia 0.5–0.6 mm. diametro, in filamentis sessilia, juventute urceolata, dein plana, disco cinnamomeo-brunneo, margine subpallidiori, maturitate non elevato; parathecium inferne 55 μ crassitudine, non superne tenuescens, dimidia parte extera pseudoparenchymate radiante, pachydermeo, cellulis ca. 5 μ diametro, extus granulis flavis insperso, dimidia parte interna hyphis tenuibus periclinalibus dense contextum; hypothecium vix evolutum; thecium 40 μ altitudine; paraphyses tenues, conglutinatae, apicibus moniliformibus sed non incrassatis; asci clavati, 25 $\times$ 5 μ; ascosporae octonae, fusiformes, hyalinae, uniloculares, 6–8 $\times$ 2.5–3 μ.

Thallus very thin, of repent filaments of *Trentepohlia* 26 μ in diameter, corticate, with hyphae 3 μ in diameter. Apothecia 0.5–0.6 mm. in diameter, sessile on the algal filaments, urceolate at first, becoming plane, disc cinnamon brown, margin slightly lighter, not elevated at maturity; parathecium 55 μ thick below the hypothecium, not thinning above; the outer half composed of radiating thick-walled pseudoparenchyma, cells up to 5 μ in diameter, the outer 15 μ inspersed with yellow granules, the inner half of slender, periclinal, densely interwoven hyphae; hypothecium scarcely differentiated from the inner layer of the parathecium; thecium 40 μ tall; paraphyses slender, unbranched, conglutinate, tips moniliform but not thickened; asci clavate, 8-spored, about 25 $\times$ 5 μ; ascospores hyaline, fusiform, unilocular, 6–8 $\times$ 2.5–3 μ.

COENOGONIUM **congensis** Dodge, sp. nov.

Type: Belgian Congo, Yangola, 20 km. west of Yangambi, on twigs of *Ouratea brunneo-purpurea* Gilg, J. Louis 12070.

Thallus dimidiatus, radius 1 cm., filamentis *Trentepohliae* 5–6 μ diametro, cellulis ad 8 μ longitudine. Apothecia convexa, sessilia in filamentis, ad 1 mm. diametro, disco ochraceo-aurantiaco, margine concolore, subdentato; parathecium 135 μ crassitudine sub hypothecio, superne ad 105 μ tenuescens, dimidia parte extera hyphis rectis septatis, pachydermeis, hyalinis extus subbrunneis, pseudoparenchyma formante, dimidia parte interna hyphis pachydermeis periclinalibus; hypothecium vix evolutum, 10 μ crassitudine, subbrunneum; thecium 55 μ altitudine; paraphyses tenues, conglutinatae, apicibus pallide brunneis non incrassatis; asci cylindrici, 50 $\times$ 3 μ; ascosporae octonae, monostichae, fusiformes, biloculares, hyalinae, leptodermeae, 6 $\times$ 2.5 μ.

Thallus dimidiate, radius 1 cm., of filaments of *Trentepohlia* 5–6 μ in diameter, cells about 8 μ long. Apothecia convex, sessile on the algal filaments, up to 1 mm. in diameter, disc ochraceous orange, margin concolorous, slightly dentate; parathecium 135 μ thick below, thinning to 105 μ thick at the margin, outer half of vertical, thick-walled, septate hyphae 4 μ in diameter, forming a pseudoparenchyma, hyaline, the outer 8 μ slightly brownish, the inner half of thick-walled, densely woven periclinal hyphae; hypothecium scarcely differentiated, represented by a slightly brownish layer about 10 μ thick; thecium 55 μ tall; paraphyses slender, unbranched, conglutinate, tips not thickened in the pale brown epithecial gel; asci 8-spored, cylindric, about 50 $\times$ 3 μ; ascospores monostichous, fusiform, bilocular, hyaline, very thin-walled, 6 $\times$ 2.5 μ.

COLLEMACEAE

Thallus gelified, crustose to foliose or dwarf-fruticose, with or without rhizinae; ecorticate or corticate with one or two layers of isodiametric cells. Apothecia immersed to sessile, amphithecium often present; parathecium often rudimentary when the amphithecium is well developed; paraphyses unbranched; asci 8-spored; ascospores hyaline or pale brownish, ellipsoidal to fusiform or acicular, unicellular to muriform.

Besides the species of *Collema* included below, there are a few scraps of at least two species of *Leptogium*, one completely unidentifiable and the other in the *L. vesiculosum* group, probably not that species and too meagre for description. The other tropical genera are small and seldom collected.

COLLEMA

COLLEMA Wiggers, Primit. Fl. Holsat. 89. 1780.

Lathagrium S. F. Gray, Nat. Arr. Brit. Pl. 1:399. 1821.
Lethagrium Mass., Mem. Lichenogr. 90. 1853.
Synechoblastus Trev., Caratt. Tre Nuov. Gen. Collemac. 3. 1853.
Blenothallia Trev., Caratt. Tre Nuov. Gen. Collemac. 3. 1853.

Type: *C. Lactuca* (Web.) Wiggers, a synonym of *Lichen crispus* L. now in sect. *Blenothallia*. *Lathagrium* S. F. Gray was based on *C. flaccidum* Ach., *C. nigrescens* (Huds.) DC., both in sect. *Collemodiopsis* Vainio, and *C. scotinum* Ach., later transferred to *Leptogium*. *C. nigrescens* may be chosen as type if the section *Collemodiopsis* is raised to generic rank. *Lethagrium* Mass. is probably only a variant spelling of *Lathagrium*. It included *C. fasciculare* Wigg., *C. rupestre* (Sw.) Rabh., *C. ascaridiosporum* Mass., *C. conglomeratum* Mass. and *C. turgidum* Ach., the last now placed in *Leptogium*. *Synechoblastus* Trev. was based on *C. aggregatum* (Ach.) Röhl., *C. nigrescens* (Huds.) DC., and *C. rupestre* (Sw.) Rabh. Since the latter two species belong in the section *Collemodiopsis*, *C. aggregatum* may be chosen as the type when *Synechoblastus* is used as a separate genus. *Blenothallia* Trev. was based on *C. cheilea* Ach. and *C. haemaleia* Smrft., the latter now placed in *Pyrenopsis*.

Thallus squamulose to foliose, gelified, without rhizinae, homoeomerous; ecorticate (except the amphithecium in sect. *Collemodiopsis*); algae *Nostoc*, hyphae loosely arranged in the algal gel. Apothecia immersed at first then erumpent, sessile to scutellate, constricted at the base; amphithecium well developed, parathecium present but more or less rudimentary; paraphyses simple, septate; asci 8-spored; ascospores acicular, fusiform or ellipsoidal (2-locular in sect. *Dicollema*, 3–pluri-locular in sect. *Collemodiopsis* and *Synechoblastus*), broadly ellipsoid and dwarf-muriform in sect. *Blenothallia*.

COLLEMA NIGRESCENS (Huds.) DC. var. MINUTUM Hue, Mém. Soc. Bot. France 8:130. 1910.

Type: French Tropical Africa, Chari, Baguirmi, corticole, A. Chevalier.

Thallus dark olive, foliose, membranous, 32 μ thick, monophyllous, 2–4 cm. in diameter, lobes 0.4–12 mm. broad, radiating, contiguous or somewhat imbricate, tips rounded, surface smooth with radiating wrinkles, paler beneath, costate, partly clinging to the underlying bark by hyphae, but not developed into rhizinae. Hyphae 2–3.75 μ, mostly perpendicular to the surface of the thallus, thin-walled, sparsely septate, in the center of the thallus periclinal and forming a loose medulla about 20 μ thick, without algae. At the surface a few periclinal hyphae forming a

highly gelified and almost amorphous cortex 8–10 μ thick, in contrast to the clearly cellular cortex of *Leptogium;* algae *Nostoc,* cells 2.5–3.75 μ in diameter, in curved, moniliform chains. Apothecia 0.4–0.6 mm. in diameter, at first immersed in the thallus, then short-pedicellate, disc rufous, plane to convex; cortex in amphithecium and pedicel 15–20 μ thick, of cells 8–10 μ in diameter, with thalline hyphae radiating between the parathecium and the amphithecial cortex between the algal colonies; parathecium hyaline, 50–80 μ thick below the thecium, thinning to 20 μ on the sides and 10 μ at the top, cells 5–15(–18) μ in diameter below the thecium, smaller and less conspicuous above; hypothecium 40 μ thick, of densely woven, periclinal hyphae; thecium 100 μ tall; paraphyses 4–5 μ in diameter, thick-walled, lumen 1.5–1.7 μ, up to 3 μ in the terminal cell; asci 8-spored, clavate, tips thickened, 75 $\times$ 12 μ; ascospores hyaline, fusiform, 4-locular, 27–32 $\times$ 4–5 μ.

In this small variety, the ascospores are smaller, as those of the species are about 34–42 $\times$ 5 μ.

Nigeria: Agbaola and Ajia near Ibadan, on *Theobroma,* C. A. Thorold 114, 115, respectively.

Cameroons: Tombel, on *Theobroma,* C. A. Thorold.

Lecideaceae

Thallus crustose, uniform or with effigurate margins, continuous, areolate or squamulose (foliose in *Psora* and dwarf-fruticose in *Sphaerophoropsis*), attached to the substrate by hyphae of the medulla or hypothallus, without rhizinae; ecorticate or with a cortex of fasciculate, thick-walled hyphae, never pseudoparenchymatous; algae *Protococcus* or *Trebouxia;* medulla loosely woven or with a basal layer suggesting the structure of the upper cortex. Apothecia round, sessile, occasionally immersed or with a very short stalk; amphithecium absent; parathecium entire or dimidiate, hyaline or carbonaceous; hypothecium hyaline; paraphyses simple or sparingly forked above the asci, free or conglutinate; asci usually 8-spored (fewer than 8 in *Mycoblastus* and *Megalospora,* or 16–32 in a few species of *Lecidea* and *Bacidia*); ascospores hyaline (brown in *Rhizocarpon*), unilocular, septate or muriform, with or without a halo. Spermogonia immersed, spermatiophores unicellular; spermatia elongate-ellipsoid to cylindrical, often very long.

1. Ascospores unicellular 2
1. Ascospores septate 3
1. Ascospores muriform 6
   2. Ascospores small and thin-walled, uninucleate ..... *Lecidea* Ach.
   2. Ascospores very thick-walled and large, multinucleate ..... *Mykoblastus* Norm.
3. Ascospores bilocular 4
3. Ascospores 4–pluri-locular 5
   4. Ascospores under 30 μ long, slender, thin-walled ..... *Catillaria* Th. Fr.
   4. Ascospores over 40 μ long, stout, thick-walled ..... *Megalospora* Mey. & Fw.
5. Thallus ecorticate, smooth or more often granular ..... *Bacidia* DNtrs.
5. Thallus corticate, verrucose to subsquamulose ..... *Toninia* Mass.
   6. Paraphyses unbranched; ascospores hyaline ..... *Lopadium* Koerb.
   6. Paraphyses branched; ascospores brown with halo ..... *Rhizocarpon* Ram.

LECIDEA

LECIDEA Ach., Meth. Lich. 32. 1803.

Type: not designated. It is probable that when we have a modern monographic treatment of this genus, it will be divided into several genera on the morphology of the apothecium. Until then, it seems best not to select a type species from the many included in the genus when it was segregated from *Lichen* L. Most of those included belong in *Lecidea* as now recognized.

Thallus crustose, continuous, areolate, verrucose, attached to the substrate by hyphae of the medulla or hypothallus, without rhizinae; ecorticate or with a thin cortex, sometimes sorediose, very rarely with true soralia; algae protococcoid. Apothecia round or angular from mutual pressure, very rarely slightly elongate, immersed, sessile or very short-stalked; parathecium hyaline, colored or black, entire or dimidiate; hypothecium hyaline or somewhat brownish; epithecium bright-colored or black; paraphyses unbranched or sparingly so above the asci; asci usually 8-spored, rarely 16-spored; ascospores hyaline, unicellular (sometimes falsely bilocular), spherical, ellipsoid or allantoid. Spermogonia immersed, with a dark mouth, spherical; spermatiophores unicellular; spermatia short-cylindric to filiform, straight or curved.

All of our material belongs in the subgenus *Biatora* with hyaline or brightly colored, more or less waxy parathecium and colored disc, sometimes darkening in age, usually corticolous or lignicolous. For completeness, I have included a key to the subgenus *Eulecidea* with a very dark, usually carbonaceous parathecium and black disc, usually saxicolous.

1. Parathecium light-colored, waxy, never carbonaceous, disc reddish, yellowish fuscous to very dark brown (almost black); corticolous (very rarely saxicolous); subg. BIATORA.....2
1. Parathecium very dark brown, usually carbonaceous, disc black or greenish black; saxicolous or terricolous; subg. EULECIDEA.....16
   2. Ascospores 16–32 per ascus, 5–8 × 2–3 μ; thallus granular-furfuraceous; apothecia 0.5–0.9 mm., dark fuscous, entire; São Thomé.....*L. furfurosula* Nyl.
   2. Ascospores 8 per ascus 3
3. Disc somewhat white-pruinose, hair-brown (benzo brown to fuscous when pruina is rubbed off); parathecium hyaline; hypothecium fuliginous above; thallus of hemispheric warts with a black margin; medulla yellowish; Guinea.....*L. granifera* (Ach.) Vainio
3. Disc not white-pruinose 4
   4. Disc testaceous, flesh-color, reddish, rarely yellowish when young.....5
   4. Disc fuscous 11
   4. Disc almost black 13
5. Ascospores 4.5–6 × 2–3 μ; thallus olive green; disc flesh-red; hypothecium yellowish-hyaline; Usambara .....*L. pannosa* Müll. Arg.
5. Ascospores 8–11 × 2–4 μ.....6
5. Ascospores larger and broader; thallus ashy 7
   6. Thallus ashy to chalky white; disc plane, pale yellow flesh-color; ascospores 7–9 × 2–3 μ; Usambara .....*L. microspermoides* Müll. Arg.
   6. Thallus ashy glaucous; disc dark red, convex; ascospores 8–9 × 4 μ; Angola.....*L. cinereorubra* Vainio
   6. Thallus dark ashy to clay color; disc subvitelline, becoming fuscous-fleshcolor, convex; ascospores 8–11 × 2–2.5 μ; Angola.....*L. tenuis* Müll. Arg.

7. Apothecia 0.3–0.7 mm., disc rufous-fleshcolor, plane; ascospores 13–14 × 6–7.5 μ; Kenya ..... *L. carneorufa* Müll. Arg.
7. Apothecia 0.5–0.6 mm., disc buckthorn brown; hypothecium pale brownish; ascospores 8–11 × 4–5.5 μ; Nigeria ..... *L. nigeriensis* Dodge
7. Apothecia 0.5–1.2 mm., disc testaceous or yellowish 8
8. Parathecium entire, black below, disc testaceous; ascospores 15 μ long; medulla yellow; Usambara ..... *L. hypomeloides* Müll. Arg.
8. Parathecium entire, outer half hyaline, inner half fuliginous, disc isabelline; ascospores 11–12 × 5–6 μ; medulla white; Guinea ..... *L. rubina* Ach.
8. Parathecium dimidiate, at least pale below, disc testaceous; Angola 9
9. Hypothallus black; ascospores 9–12 × 6–8 μ ..... *L. caliginosa* v. *rhacocarpa* Vainio
9. Hypothallus white or inconspicuous 10
10. Ascospores 9–14(–17) × 4–5 μ; parathecium pale ..... *L. gyalectoides* Vainio
10. Ascospores 8–12 × 5–7 μ; parathecium fuscescent ..... *L. capopensis* Vainio
11. Hypothecium fuscous black; apothecia 0.5–0.8 mm.; ascospores 12–16 × 6–7 μ; Erythaea ..... *L. albocincta* Vainio
11. Hypothecium hyaline 12
12. Thecium yellowish; apothecia 0.5–0.75 mm.; ascospores 9–11 × 4–5 μ; Kenya ..... *L. endochrysea* Müll. Arg.
12. Thecium hyaline; apothecia 0.3 mm.; ascospores 9–11 × 6–7 μ; Ilha Principe ..... *L. citima* Nyl.
12. Thecium hyaline; apothecia 1 mm.; ascospores 12 × 6 μ; Usambara ..... *L. phaeophthalma* Zahlbr.
13. Apothecia 0.4–0.5 mm.; thecium 45 μ tall; ascospores 7–15 × 3–5 μ; Angola ..... *L. Sangeana* Vainio
13. Apothecia 0.5 mm.; ascospores 11–13 × 8–9 μ; saxicole; Kenya [may belong in Eulecidea] ..... *L. trachytica* Müll. Arg.
13. Apothecia 0.7–1.6 mm. 14
14. Thallus white-punctate; thecium 75–84 μ tall; ascospores 12 × 6 μ; Usambara ..... *L. phaeophthalma* Zahlbr.
14. Thallus smooth; thecium 60–65 μ tall; ascospores 15 × 4.5 μ; Usambara ..... *L. amaniensis* Zahlbr.
14. Thallus verruculose to granulose; Angola 15
15. Ascospores 9–13 × 6–7 μ ..... *L. nigricans* Vainio
15. Ascospores 8–9 × 6.5–7 μ ..... *L. mossamedana* Vainio
16. Apothecia innate, parathecium little developed [may belong in *Aspicilia*] 17
16. Apothecia emersed to sessile 19
17. Thallus white, immarginate; apothecia 0.5–0.9 mm., disc chalky pruinose; parathecium dark, hypothecium hyaline; Angola ..... *L. lithagoga* (Nyl.) Vainio
17. Thallus pale glaucous; apothecia 1 mm.; disc black; parathecium and hypothecium umber fuscous; Kenya ..... *L. glauconigra* Steiner
17. Thallus yellow ashy; disc black; parathecium hyaline 18
18. Thallus black-margined; apothecia 0.15–0.25 mm.; ascospores 8–11 × 4–4.5 μ; Angola ..... *L. angolensis* Müll. Arg.
18. Thallus not black-margined; apothecia 0.3(–0.4) mm.; ascospores 9–13 × 5–6.5 μ; Kenya ..... *L. angolensis* v. *orientalis* Steiner
19. Thallus squamulose at the margin, gray or white; Central Africa 20
19. Thallus leprose-granulose, yellowish; apothecia 0.13–0.3 mm., disc black, parathecium entire, fuscous; ascospores 8–9 × 6–7 μ; Kenya ..... *L. xanthinula* Müll. Arg.
19. Thallus dispersed, glebous, pale glaucous; apothecia 0.5 mm., disc black; parathecium entire, hyaline but top of thecium blue-green; ascospores 11–13 × 8–9 μ; Kenya ..... *L. trachytica* Müll. Arg.
19. Thallus slightly granulose, disappearing 21
20. Ascospores 7–8 × 3–4 μ; Uganda ..... *L. Cagnii* Jatta
20. Ascospores 9.5–15 × 5.5–6 μ; Ruanda ..... *L. argillicola* Lindau
21. Apothecia white-pruinose when young, then black; ascospore size not given; Abyssinia ..... *L. bogosensis* Zahlbr.
21. Apothecia black, 0.5–0.7 mm.; ascospores 8–11 × 2.5–3 μ; Angola ..... *L. leptobola* Nyl.

Lecidea granifera Vainio, Cat. Welwitsch Afric. Pl. 2:424. 1901.

Lecanora granifera Ach., Syn. Lich. 164. 1814.

Type: Guinea, corticole, Afzelius.

Thallus crustose, verrucose, 100–125 μ thick, vetiver green; cortex 10–12 μ

thick, gelified, amorphous; algae *Trebouxia,* cells subspherical, 5–6 μ in diameter, closely packed in spherical colonies about 20 μ in diameter; medulla of thick-walled hyphae 7–8 μ in diameter, very loosely woven in the larger warts; cortex finally disappearing and the colonies of algae escaping as soredia, not in definite soralia. Apothecia biatorine, round at first, becoming very irregular, sublobate from unequal expansion of the parathecium, margin white, disc benzo brown to fuscous, slightly pruinose when young, partly immersed to sessile on thalline warts, the thallus extending nearly to the top of the parathecium when young, forming a thin pseudo-amphithecium, but covering only the base of the parathecium when mature; parathecium hyaline, 370 μ thick in the center, thinning to the slightly elevated margin, slightly inflexed when dry and disc slightly concave to plane, when moist the parathecium is almost level with the slightly convex disc, composed of radiating pseudoparenchyma, highly gelified, the upper 40 μ under the hypothecium fuliginous, the rest hyaline; thecium 95 μ tall; hypothecium not clearly differentiated; paraphyses conglutinate, slender, once or twice dichotomous above the asci, tips not thickened in the slightly brownish epithecial gel; asci 8-spored, clavate, tip thickened when young, 55 $\times$ 8 μ; ascospores unicellular, monostichous, subspherical, 7–8 μ in diameter.

Due to the deep fuliginous color which extends from the upper part of the parathecium through the hypothecium shading off gradually through the lower 25 μ of the thecium, it is very difficult to see how much is hypothecium and its structure. The systematic position of this species is somewhat uncertain. In the young stages, the sides of the parathecium are nearly covered by thallus and very rarely one can find an algal cell which has penetrated the outer side of the parathecium, so that one might be justified in following Acharius and leaving the species in *Lecanora.* On the other hand, the very highly developed, biatorine parathecium and lack of algal layer or medulla of an amphithecium in the mature apothecium suggest a much closer relation to *Lecidea* sect. *Biatora* where it was placed by Vainio. This is a very different situation from the ambiguous species between *Rinodina* and *Buellia* where a true amphithecium is formed, then the algae die and the amphithecium blackens but leaves traces of medulla and lacunae where the algae have disappeared. Vainio recognized two varieties: *lecanoroides,* the typical form, and *leucotropoides,* with a testaceous disc, which he later raised to specific rank. I have seen no material referable to the latter.

Nigeria: Ina near Ibadan, on *Theobroma,* C. A. Thorold 151a *pro parte,* 156; Ondo Province, Owena and Aponmu near Akure on *Theobroma,* C. A. Thorold 157, 158, respectively.

LECIDEA TENUIS Müll. Arg., Linnaea 63:34. 1880.

Type: Angola, Quillu River, growing over sterile *Chiodecton,* Pechuel-Loesche.

Thallus smooth to minutely verrucose, deep olive buff, not black-margined, 80 μ thick; cortex 6–8 μ thick, decomposed, of periclinal hyphae; algae *Trebouxia?,* in discrete cylindric colonies 25–40 μ in diameter, cells 4–8 μ in diameter; medulla

scarcely differentiated. Apothecia 0.4–0.5 mm. in diameter, margin white, disc waxy, plane at first, becoming very convex, warm buff; parathecium 180 μ thick below the hypothecium, thinning to 40 μ or less at the top of the thecium, hyaline, the inner 100 μ of gelified, thick-walled, periclinal hyphae, the outer 80 μ of radiating, septate hyphae 6 μ in diameter, forming a pseudoparenchyma; hypothecium 30 μ thick, of slender, more deeply staining, vertical hyphae, not sharply differentiated from the thecium; thecium 40 μ tall; paraphyses slender, once or twice dichotomous above the asci, tips not thickened in the very pale brownish epithecial gel; asci cylindric-clavate, 8-spored, 30 $\times$ 6 μ; ascospores hyaline, unicellular, long-ellipsoid, thin-walled, 6–7 $\times$ 2–3 μ.

Our material differs in some respects from Müller Argau's description. The apothecia are more strongly convex at maturity, the parathecium (hypothecium of Müller Argau) is not slightly yellowish below, and the ascospores are slightly shorter and broader (Müller Argau states: 8–11 $\times$ 2–2.5 μ). *L. microspermoides* Müll. Arg., from Usambara, has a chalky thallus, larger apothecia, a darker disc and ascospores 7–9 $\times$ 2–3 μ.

Nigeria: Ondo, on *Theobroma*, C. A. Thorold 110.

Lecidea (Biatora) **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Ekialodor near Benin City, on *Theobroma*, C. A. Thorold 135.

Thallus epiphloeodes, laevis vel subrugulosus, nigro-marginatus, obscure olivaceo-alutaceus, 80 μ crassitudine; cortex vix evolutus; algae protococcoideae, cellulis 6–8 μ diametro; medulla nulla. Apothecia 0.5–0.6 mm. diametro, margine thallo concolore, disco plano, subpruinoso, brunneo, linea angusta nigra circumdato; parathecium hyalinum, 110–120 μ crassitudine sub hypothecio, superne ad 40 μ tenuescens, pseudoparenchymaticum, cellulis 5–8 μ diametro, radialiter elongatis; hypothecium 20 μ crassitudine, hyphis subbrunneis, dense contextum; thecium 95 μ altitudine; paraphyses tenues, semel bisve dichotome ramosae super ascos, apicibus non incrassatis; asci clavati, 80 $\times$ 8 μ; ascosporae octonae, inbricatim monostichae vel subdistichae, hyalinae, ellipsoideae, uniloculares (false biloculares juventute), 8–11 $\times$ 4–5.5 μ.

Thallus smooth to slightly wrinkled, black-margined, deep olive buff, 80 μ thick; cortex not differentiated; algae protococcoid, cells 6–8 μ in diameter, filling the whole thallus but more densely packed above. Apothecia 0.5–0.6 mm. in diameter, margin concolorous with the thallus, disc plane, slightly pruinose, buckthorn brown, surrounded by a very narrow black line due to blackening of the top of the parathecium next the thecium; parathecium hyaline, 110–120 μ thick below the hypothecium, thinning to 40 μ at the top of the thecium, pseudoparenchymatous, cells 5–8 μ in diameter, elongated radially; hypothecium 20 μ thick, of densely woven, slightly brownish hyphae; thecium 95 μ tall; paraphyses slender, once or twice dichotomous above the asci, tips not enlarged in the very pale brownish epithecial gel; asci clavate, 8-spored, 80 $\times$ 8 μ; ascospores imbricately monostichous to subdistichous, hyaline, ellipsoidal, unilocular (falsely bilocular when young), 8–11 $\times$ 4–5.5 μ.

LECIDEA RUBINA Ach., Syn. Lich. 40. 1814.

Biatora rubina Bél., Voy. Ind. Orient. 2:Crypt.:128. 1846.

Type: Guinea, on bark of *Uvaria* etc., Afzelius.

Thallus smooth, somewhat rimose, citrine drab, 55 μ thick; cortex 8 μ thick, decomposed, of periclinal hyphae; algal layer 20–25 μ thick, of rounded colonies of *Trebouxia,* cells about 5 μ in diameter, closely packed; medulla of densely woven, subvertical hyphae, penetrating between the cork cells and disorganizing them to a depth of 40 μ. Apothecia 0.7–1 mm., round, sessile, margin concolorous with the thallus, disc plane then convex, isabelline, darkening; parathecium 105 μ below the hypothecium, thinning to 55 μ at the level of the thecium, the inner half deep fuliginous, the outer half hyaline, of thick-walled pseudoparenchyma, cells 5–6 μ in diameter, elongated radially; hypothecium about 15 μ thick, not sharply differentiated; thecium 95 μ tall; paraphyses coherent, gelified, once or twice dichotomous above the asci, ending in the slightly brownish epithecial gel; asci clavate, 8-spored, 65 $\times$ 12 μ, wall and tip thickened when young; ascospores imbricately monostichous to subdistichous, hyaline, unilocular, ellipsoidal, 11–12 $\times$ 5–6 μ.

After the ascospores are shed, new apothecia proliferate from the margins of the disc and become partly confluent, resulting in lobed and distorted apothecia. *Thorold 131* has the fuliginous portion of the parathecium 135 μ thick in the center and the hyaline portion 55 μ, otherwise it is similar to the other specimens.

Nigeria: Ife near Ibadan, on *Theobroma,* C. A. Thorold 152; Ondo Province, Aponmu near Akure, on *Theobroma,* C. A. Thorold 153; Igede near Ado Ekiti, on *Theobroma,* C. A. Thorold 154; Ondo, on *Theobroma,* C. A. Thorold 109; Ado Ekiti near Ondo, on *Theobroma,* C. A. Thorold 131.

BACIDIA

BACIDIA DNtrs., Giorn. Bot. Ital. 1:189. 1846.

Type: Not designated, based on *Lecidea rosella* Ach. and *L. carnea* Ach. Since *L. carnea* Ach. has been transferred elsewhere, we may accept *L. rosella* Ach. as the type, as this would conserve the genus in its sense commonly used. The synonymy of this very large and variable genus is very confused, hence I have not cited the various synonyms. In our collections there are only two species, one in sect. *Weitenwebera* Zahlbr. (*Bilimbia* DNtrs. *non* Reichb., *Weitenwebera* Opiz *non* Schrank) with fusiform ascospores, and one in sect. *Eubacidia* Zahlbr. with acicular ascospores. As these two sections are well represented in tropical Africa, I have prepared keys.

Thallus crustose, homoeomerous or heteromerous; ecorticate or cortex poorly developed; algae protococcoid. Apothecia sessile, rarely somewhat immersed or almost stipitate, with a flat or very convex disc; parathecium light-colored; hypothecium hyaline or darkening; asci usually 8-spored; ascospores hyaline, long-fusiform to acicular, 3–many-septate, walls and septa thin, protoplasts cylindric, straight, curved, or helical. Spermatia exobasidial, acicular, straight or curved.

1. Ascospores long-ellipsoid to fusiform, not over 25 μ long; sect. Weitenwebera (Bilimbia DNtrs. et Auct.) 2
1. Ascospores acicular, over 25 μ long, usually not over 3 μ in diameter; sect. Eubacidia 10
2. Ascospores more than 14 μ long, 4–8-locular 3
2. Ascospores less than 14 μ long, 4-locular 7
3. Apothecia yellowish testaceous, ascospores 4-locular, 14–17 × 4–5 μ; São Thomé ..... *Catillaria subternella* (Nyl.) Zahlbr.
3. Apothecia finally black or nearly so 4
4. Ascospores 4-locular, 14–17 × 4–5 μ 5
4. Ascospores 6–8-locular, 17–22 μ long 6
5. Thallus white, disc black; São Thomé ..... *B. imitans* (Nyl.) Zahlbr.
5. Thallus ashy white, disc olive black; Usambara ..... *B. stellaris* (Müll. Arg.) Zahlbr.
6. Hypothecium hyaline; ascospores 17–22 × 5–6 μ, disc fuscous; Abyssinia ..... *B. abessinica* (Müll. Arg.) Zahlbr.
6. Hypothecium fuscous; ascospores 18 × 3 μ; disc black; Uganda ..... *B. Scottii* (Vainio) Zahlbr.
7. Thallus white, somewhat farinaceous 8
7. Thallus yellowish 9
7. Thallus green; apothecia 0.15–0.25 mm., disc fuscous; Angola ..... *B. exiguella* (Vainio) Zahlbr.
8. Apothecia black, ascospores 10–12 × 3.5 μ; São Thomé ..... *B. vagula* (Nyl.) Zahlbr.
8. Apothecia rose fleshcolor; ascospores 8–12 × 2.5–3.5 μ; Angola ..... *B. farinulenta* (Müll. Arg.) Zahlbr.
9. Thallus yellowish ashy; apothecia 0.3–0.5 mm., disc and hypothecium fuscous; Angola ..... *B. sublecanorina* (Müll. Arg.) Zahlbr.
9. Thallus pale yellow-olive; apothecia 0.5–0.8 mm., disc ochraceous orange; hypothecium hyaline; Nigeria ..... *B. nigeriensis* Dodge
10. Disc white-pruinose, epithecium and hypothecium fuscous; ascospores 27–34 × 5–5.5 μ, 6–8-locular; Central Africa ..... *B. griseoalba* Lindau
10. Disc flesh color to rufous, at least when young 11
10. Disc soon black 14
11. Hypothecium rufous becoming fuscous; ascospores 62–70 × 2–4 μ; Kenya ..... *B. araneosa* (Hue) Zahlbr.
11. Hypothecium deep yellow; ascospores 40–65 × 2.5–3 μ, 8–10-locular; Kenya ..... *B. submillegrana* Steiner
11. Hypothecium hyaline (sometimes slightly yellowish in *B. nigrocincta*) 12
12. Ascospores 45–55 × 3.5–4.5 μ; apothecia 0.5–1 mm., disc flesh color; hypothallus black; Usambara ..... *B. nigrocincta* (Müll. Arg.) Zahlbr.
12. Ascospores less than 42 μ long 13
13. Ascospores 25–30 × 1.5 μ; apothecia 0.4–0.6 mm.; thallus ashy olive; Usambara ..... *B. trichosperma* (Müll. Arg.) Zahlbr.
13. Ascospores 28–32 × 2.5 μ; apothecia 0.25–0.4 mm.; thallus white; Ascension Island ..... *B. atlantica* (Müll. Arg.) Zahlbr.
13. Ascospores 26–42 × 2.5–3 μ; apothecia 0.5 mm.; thallus glaucous; Angola ..... *B. golungensis* (Vainio) Zahlbr.
13. Ascospores 38–41 × 4 μ; thallus ochraceous; Abyssinia ..... *B. Kotschyi* (Krmphbr.) Zahlbr.
14. Hypothecium tawny fuscous to rufous; thallus white or glaucescent 15
14. Hypothecium deep yellow; thecium 75–80 μ; ascospores 72–80 × 3 μ, 15–20-locular; Usambara ..... *B. endoleucella* v. *colorata* Zahlbr.
14. Hypothecium hyaline 16
15. Ascospores 34–38 × 2–2.5 μ, 4–6-locular; apothecia 0.7–1 mm.; Guinea (Togoland) ..... *B. infuscata* (Müll. Arg.) Zahlbr.
15. Ascospores 42–58 × 3.5–4 μ, 8–9-locular; apothecia 0.8–1 mm.; Angola ..... *B. byssothallina* (Vainio) Zahlbr.
15. Ascospores 62 × 3–3.5 μ, 10–14-locular; apothecia 0.5–1 mm.; Socotra ..... *B. socotrana* (Müll. Arg.) Zahlbr.
15. Ascospores 55 × 4 μ, 10–15-locular; apothecia 0.3–0.4 mm.; Socotra ..... *B. decussata* (Müll. Arg.) Zahlbr.
16. Ascospores 46–54 × 2–3 μ; Angola ..... *B. amylothelia* Vainio
16. Ascospores 65–75 × 3–4 μ; São Thomé ..... *B. leucotrypta* (Nyl.) Zahlbr.
16. Ascospores 36–56 × 2–3.5 μ, 6–10-locular; Angola ..... *B. heteroloma* v. *elongata* (Vainio) Zahlbr.
16. Ascospores 17–28 × 3.5 μ; thecium 55–60 μ; Angola ..... *B. heteroloma* v. *bacteriospora* (Vainio) Zahlbr.

BACIDIA (WEITENWEBERA) **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Ondo Province, Owena, on *Theobroma*, C. A. Thorold 111.

Thallus laevis vel minute verruculosus, pallide flavo-olivaceus, 40–80 μ crassitudine; cortex vix evolutus; stratum algarum 25 μ crassitudine, cellulis protococcoideis 5–6 μ diametro; medulla 15–55 μ crassitudine, hyphis 3 μ diametro, laxe intertextis. Apothecia sessilia, 0.5–0.8 mm. diametro, margine albo, disco ceraceo, ochraceo-aurantiaco, madefacto albo; parathecium hyalinum, inferne 55 μ crassitudine, superne ad 25 μ tenuescens, pseudoparenchymaticum, dimidia parte exteriore hyphis radiantibus 5–6 μ diametro, cellulis terminalibus rotundatis majoribusque, dimidia parte interiore hyphis periclinalibus 3–4 μ diametro; hypothecium ca. 15 μ crassitudine; thecium 55 μ altitudine; paraphyses tenues, liberae, 2.5 μ diametro, pachydermeae, apicibus non incrassatis; asci clavati, 30 $\times$ 6 μ; ascosporae octonae, ellipsoideae vel subfusiformes, hyalinae, leptodermeae, 4-loculares, 9–12 $\times$ 2.5–3 μ.

Thallus smooth to minutely verrucose, 40–80 μ thick, light yellowish olive; cortex not well differentiated; algal layer 25 μ thick, protococcoid cells 5–6 μ in diameter, in a compact layer; medulla 15–55 μ thick, of loosely woven hyphae about 3 μ in diameter. Apothecia sessile, 0.5–0.8 mm. in diameter, margin white, disc waxy, ochraceous orange becoming almost white when moistened; parathecium hyaline, 55 μ thick below the hypothecium, thinning to 25 μ thick above, pseudoparenchymatous, the outer half of radiating hyphae 5–6 μ in diameter, outermost cells rounded and somewhat larger, inner half of mostly periclinal hyphae 3–4 μ in diameter; hypothecium about 15 μ thick, not sharply differentiated; thecium 55 μ tall; paraphyses slender, free, about 2.5 μ in diameter, thick-walled, tips not thickened; asci clavate, 8-spored, about 30 $\times$ 6 μ, tips somewhat thickened when young; ascospores ellipsoid to subfusiform, hyaline, 4-locular, thin-walled, 9–12 $\times$ 2.5–3 μ.

It is with some hesitation that I have referred *Deighton M4307A* to this species, as the parathecium is 95–105 μ thick below, thinning to 55 μ above, and the ascospores are smaller, 7–9 $\times$ 2.5–3 μ; otherwise it agrees well with the Nigerian material.

Nigeria: Ondo Province, Owena, on *Theobroma*, C. A. Thorold 111, type; Ikere near Ondo, on *Theobroma*, C. A. Thorold 112.

Sierra Leone: Njala (Kori), on twigs of *Bauhinia tomentosa*, F. C. Deighton M4307A.

BACIDIA (EUBACIDIA) GOLUNGENSIS (Vainio) Zahlbr., Cat. Lich. Univ. 4:202. 1926.

Lecidea golungensis Vainio, Cat. Welwitsch Afric. Pl. 2:419. 1901.

Type: Angola, Golungo Alto, near Sange, 320–775 m., Welwitsch 135a, 136 as v. *pauciseptata*, 149 *p.p.* as v. *pluriseptata;* Serra de Alta Queta, Welwitsch 150c, 151 as v. *pauciseptata*, 154 as v. *pluriseptata*. No specimen cited as type of the species (see discussion below).

Thallus granular-verrucose, continuous, citrine drab, 40 μ thick; cortex gelified, 5–6 μ thick; algal colonies discrete, 15–20 μ in diameter, of *Trebouxia,* closely packed cells 3–4 μ in diameter; medulla 14–19 μ thick, gelified, of densely woven hyphae. Apothecia sessile, margin very thin, soon immarginate, 0.5 mm. in diameter, sometimes concrescent in groups up to 1 mm. in diameter, disc avellaneous to wood brown; parathecium 80–150 μ thick below the hypothecium, thinning to 25 μ at the top of the thecium, hyaline, inner half of slender, periclinal gelified hyphae, the outer half of radiating, thick-walled, conglutinate hyphae 5–6 μ in diameter, occasionally penetrated by a few algal cells; hypothecium 15 μ thick, of densely woven, mostly periclinal, slender hyphae; thecium 55–70 μ tall; paraphyses slender, coherent, once or twice dichotomous above the asci, tips clavate in the slightly brownish epithecial gel; asci cylindric-clavate, 8-spored, about 45 $\times$ 8 μ; ascospores acicular, fascicled, 3–6-septate, 26–42 $\times$ 2.5–3 μ. Spermogonia spherical, half emersed from the thallus at the edge of the parathecium, about 80 μ in diameter, wall of exposed portion blackened to a depth of 15 μ, rest hyaline, filamentous, 15 μ thick; spermatiophores flask-shaped, about 10 $\times$ 2 μ; spermatia bacilliform, straight, about 6 $\times$ 1 μ.

Vainio separated this species into two varieties, *pauciseptata,* with the thecium 55–65 μ tall, ascospores 4-locular, 26–36 μ long, and var. *pluriseptata,* with the thecium 60–70 μ tall, ascospores 5–7-locular, 38–42 μ long. In my material, using gentle pressure on the cover glass, I have found free ascospores 32 and 40 μ long up to 8-locular.

Nigeria: Ina near Ibadan, on *Theobroma,* C. A. Thorold 151; Ondo Province, Aponmu near Akure, on *Theobroma,* C. A. Thorold 172b.

BACIDIA HETEROLOMA Zahlbr., Cat. Lich. Univ. 4:204. 1926.

Lecidea heteroloma Vainio, Cat. Welwitsch Afric. Pl. 2:418. 1901.

Type: Angola, Golungo Alto, near Sange, 360–775 m., corticole, Welwitsch 125, 148, 149.

Thallus slightly verrucose, uneven and rimose, margin pale, indefinite on bark, pale olive buff, 65–80 μ thick; cortex 10–12 μ thick, of slender thin-walled periclinal hyphae, the outer ones somewhat decomposed; algae *Trebouxia,* filling the rest of the thallus, cells about 6 μ in diameter; medullary hyphae partly disintegrating bark cells to a depth of 140 μ. Apothecia sessile, constricted at the base, round or somewhat distorted by mutual pressure, 0.5–0.7 mm. in diameter or in groups 1 $\times$ 2 mm.; margin prominent, pale ashy or brownish becoming nearly black in age, disc concave to plane, fuscous black; parathecium sulphate green when first sectioned soon fading in lacto-phenol, 140 μ thick below the hypothecium, thinning to 65 μ at the top of the thecium, of radiating pseudoparenchyma, cells 6–8 μ in diameter, thick-walled; hypothecium probably hyaline (pale brown in my moribund specimens), about 25 μ thick, of closely woven, slender

hyphae; thecium 60 μ tall; paraphyses slender, dichotomous above the asci, tips not thickened in the pale brownish epithecial gel; asci long-ellipsoid, 8-spored, 45 $\times$ 6 μ; ascospores hyaline, acicular, plurilocular, 35 $\times$ 2.5 μ.

My material is moribund, and much of the thecium has begun to disintegrate. The one ascus near the parathecium clearly seen is probably somewhat immature, as I could not see the septa of the ascospores clearly enough to count them and I found no free ascospores. Vainio describes the ascospores as 36–56 $\times$ 2–3.5 μ, 6–10-locular. He described two varieties: v. *elongata* which should be taken as his *varietas typica* since he repeats the dimensions of the ascospores for it, and v. *bacteriospora* with paler apothecial margins and smaller ascospores 17–28 $\times$ 3–3.5 μ.

Sierra Leone: Njala (Kori), on *Phyllanthus discoideus*, F. C. Deighton M4581.

LOPADIUM

LOPADIUM Koerb., Syst. Lich. Germ. 210. 1854.

Heterothecium Mont. in Gay, Hist. Fís. Polít. Chile, Bot. 8:175. 1852, *non* Flotow, 1850.

Brigantiaea Trev., Spighe e Paglie 7. 1853.

Type: *L. pezizoideum* (Ach.) Koerb. *Heterothecium* Mont., *non* Fw., was based on *H. Berteroanum* Mont. *Brigantiaea* Trev. was based on *Heterothecium Berteroanum* Mont., *B. Mariae* Trev., *B. tricolor* Trev., *B. tristis* Trev., and *B. argentea* Trev. When *Lopadium sensu latiore* is monographed, it seems probable that *Brigantiaea* Trev. will be recognized as a separate genus, and there will be no need to conserve *Lopadium* Koerb.

Thallus crustose, ecorticate or nearly so; algae protococcoid. Apothecia sessile; parathecium fleshy, cartilaginous, and light colored, or carbonaceous; hypothecium hyaline to dark colored; asci 1–8-spored; ascospores hyaline, muriform, thin-walled, without a halo; spermatia ellipsoidal, short, straight.

1. Foliicolous 2
1. Corticolous; asci monosporous, rarely 2–3-spored 3
   2. Asci 8-spored; ascospores 18–19 $\times$ 8–9 μ, 4(–7)-locular, 2(–4)-locellate, disc black; São Thomé ..... *L. Newtonianum* (Henriques) Sant.
   2. Asci 1-spored; ascospores 65–85 $\times$ 16–23 μ, disc fuscescent, flesh color; São Thomé; ..... *L. glaucophaeoides* (Nyl.) Zahlbr.
3. Thallus white 4
3. Thallus glaucous; disc testaceo-fuscous, margin pale; ascospores 60–73 $\times$ 20–24 μ; Angola ..... *Lecidea olivacea* v. *alsodinea* Vainio
3. Thallus olive buff or darker 5
   4. Disc watery fuscous, margin with thalline granules; ascospores 65 $\times$ 25 μ; Usambara ..... *L. lecanorinum* Müll. Arg.
   4. Disc sepia, only slightly pruinose; ascospores 32–43(–60) $\times$ 19–21 μ; Sierra Leone ..... *L. sepiaceum* Dodge
5. Disc isabelline, coarsely white-pruinose; ascospores 61–88 $\times$ 16–20 μ; Sierra Leone ..... *L. Deightoni* Dodge
5. Disc and margin clove brown, blackening; ascospores 43–56(–66) $\times$ 16–21(–23) μ; Sierra Leone ..... *L. nigrobrunneum* Dodge

LOPADIUM **sepiaceum** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on *Bauhinia tomentosa*, F. C. Deighton M4307B.

Thallus verruculosus, margine pallido, 80 μ crassitudine, albidus; cortex vix evolutus; algae protococcoideae, cellulis 5–6 μ diametro. Apothecia sessilia, basi constricta, margine subelevata, thallo concolore, subpruinosa, disco sepiaceo; parathecium inferne 55 μ, superne ad 15 μ tenuescens, hyphis pachydermeis radiantibus, luminibus 4 μ diametro, hyalinum, extus brunnescens; hypothecium brunneum, centro 55 μ ad marginem 15 μ tenuescens, hyphis 4–5 μ diametro; thecium 105–110 μ altitudine; paraphyses super ascos dichotome ramosae, apicibus non incrassatis; asci pachydermei, cylindrici, 95 $\times$ 20–24 μ; ascosporae binae vel ternae, muriformes, pallide brunneae, ellipsoideae, 32–43 (–60) $\times$ 19–21 μ.

Thallus whitish, minutely verrucose, margin pale, 80 μ thick; cortex not well differentiated; algae protococcoid, filling the whole thallus, but not closely packed, cells 5–6 μ in diameter. Apothecia sessile, constricted at the base, margin slightly elevated, concolorous with the thallus, slightly pruinose, disc sepia; parathecium 55 μ thick below, thinning to 15 μ above, of thick-walled radiating hyphae, lumen about 4 μ in diameter, hyaline, brownish on the outside; hypothecium deep brown, 55 μ thick in the center, thinning to 15 μ at the margin, of hyphae 4–5 μ in diameter; thecium 105–110 μ tall; paraphyses dichotomous above the asci, tips not thickened in the brown epithecial gel; asci thick-walled, cylindric, 2–3-spored, 95 $\times$ 20–24 μ; ascospores monostichous, muriform, pale brownish, without a halo, ellipsoid, 32–43 (–60) $\times$ 19–21 μ.

LOPADIUM **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on *Bauhinia tomentosa,* F. C. Deighton M4307C.

Thallus minute verruculosus, margine pallido, 65 μ crassitudine, obscure olivaceo-alutaceus; cortex vix evolutus, ca. 8 μ crassitudine, hyphis periclinalibus; stratum algarum 25 μ crassitudine, continuum, cellulis protococcoideis, 5–6 μ diametro, laxe dispositis; medulla 30–35 μ crassitudine, hyphis dense contexta. Apothecia 0.6–0.8 mm. diametro, basi constricta, margine subelevato, disco concolore, pruinoso; discus isabellinus, planus, granuloso-pruinosus; parathecium inferne 65 μ crassitudine, superne ad 30 μ tenuescens, hyalinum, pseudoparenchymaticum, cellulis radiantibus; hypothecium centro 40 μ crassitudine, ad marginem 15 μ tenuescens, hyphis periclinalibus dense contextum; thecium 130 μ altitudine, superficie inaequali; paraphyses pachydermeae, super ascos dichotome ramosae, cellula apicali subsphaerica, 5–6 μ diametro; asci cylindrico-clavati, pachydermei, 120 $\times$ 27 μ; ascosporae solitariae vel rare binae, ellipsoideae, hyalinae vel subbrunneae, sine halone, muriformes, 61–88 $\times$ 16–20 μ (solitariae) vel 50–60 $\times$ 16 μ (binae).

Thallus minutely verruculose, margin pale, 65 μ thick, deep olive buff; cortex scarcely developed, about 8 μ thick, of periclinal hyphae; algal layer continuous, protococcoid, cells 5–6 μ in diameter, loosely packed; medulla 30–35 μ thick, of densely woven hyphae. Apothecia 0.6–0.8 mm. in diameter, constricted at the base, margin somewhat elevated, pruinose, colored like the disc which is plane, isabelline, covered by a coarse granular pruina; parathecium 65 μ thick below,

thinning to 30 μ above, hyaline, pseudoparenchymatous, cells radiating; hypothecium 40 μ thick in the center, of closely woven, periclinal hyphae; thecium 130 μ tall, surface uneven; paraphyses thick-walled, dichotomously branched above the asci, the terminal cells subspherical, 5–6 μ in diameter; asci cylindric-clavate, thick-walled, 1–2-spored, 120 $\times$ 27 μ; ascospores ellipsoid, hyaline or slightly brownish when old but without a halo, muriform, 61–88 $\times$ 16–20 μ when single, 50–60 $\times$ 16 μ when two per ascus.

Deighton 4344 is older than the type and the apothecia have begun to disintegrate, but the structure is the same and the spores are of the same size. The thallus bears abundant campylidia, otiform, conchiform or cyphelliform, cinnamon buff, about 1 mm. tall and broad; stalk 125 μ tall, 250 μ in diameter with hairs 40 μ long; context 120–135 μ thick, the outer 15 μ forming a fine tomentum of curved, brownish, thick-walled hairs 5–6 μ in diameter, with protococcoid algae penetrating in an irregular layer 80–90 μ thick, the rest of conglutinate, densely woven, thick-walled, hyaline hyphae 6 μ in diameter; subhymenium about 15 μ thick, of slender vertical hyphae covering the inner (proximal) portion, leaving the distal portion of the cup sterile; conidiophores somewhat flexuous, 30 $\times$ 3 μ, with 1–2 short sterigmata; conidia 16 $\times$ 2 μ, very thin-walled, slightly curved, unicellular.

The campylidium has often been considered a parasitic fungus and described as a species of *Cyphella* or *Chlorocyphella,* but the layer of protococcoid algae is similar to those of the species of *Lopadium* on which it develops, and continuous with the algal layer of the thallus. This seems to indicate that it is a genuine conidial state of the fungus component of *Lopadium,* as originally described by Müller Argau. Frequently I have seen this conidial state on various species of *Lopadium* and on the foliicolous *Sporopodium* from Texas southward in tropical America.

Sierra Leone: Njala (Kori), on *Bauhinia tomentosa,* F. C. Deighton M4307C, type; on *Lagerstroemia speciosa,* F. C. Deighton M4344.

LOPADIUM **nigrobrunneum** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on twigs of *Lagerstroemia speciosa,* F. C. Deighton M4346.

Thallus verruculosus subrimulosusque, in hypothallo nigro, 65 μ crassitudine, olivaceo-alutaceus; cortex vix evolutus; stratum algarum 20–25 μ crassitudine, protococcoideum, cellulis 6–7 μ diametro; medulla 25–30 μ crassitudine, hyphis 3–4 μ diametro laxe intertextis; hypothallus 15 μ crassitudine hyphis periclinalibus brunneis. Apothecia 0.5–0.7 mm. diametro, subconvexa, basi constricta, margine et disco nigricantibus; parathecium inferne 40 μ crassitudine, superne ad 15 μ tenuescens, pseudoparenchymaticum, hyalinum, hyphis radiantibus, cellulis 6–7 μ diametro; hypothecium obscure brunneum, centro 40 μ crassitudine ad marginem 20 μ tenuescens; thecium 100–105 μ altitudine, superficie inaequali; paraphyses conglutinatae, pachydermeae, super ascos dichotome ramosae, apicibus non in-

crassatis; asci cylindrico-clavati, ca. 100 × 30 μ; ascosporae solitariae vel binae, hyalinae vel subbrunneae, sine halone, muriformes, 43–56(–66) × 16–21(–23) μ.

Thallus minutely verrucose and subrimulose, on a black hypothallus, olive buff, 65 μ thick; cortex scarcely differentiated; algal layer 20–25 μ thick, protococcoid, cells 6–7 μ in diameter; medulla 25–30 μ thick, of somewhat loosely woven hyphae 3–4 μ in diameter; hypothallus 15 μ thick, of periclinal brown hyphae. Apothecia 0.5–0.7 mm. in diameter, slightly convex, constricted at the base, margin and disc clove brown, blackening; parathecium 40 μ thick below, thinning to 15 μ at the slightly inflexed top, pseudoparenchymatous, of radiating hyphae, cells 6–7 μ in diameter; hypothecium very dark brown, 40 μ thick in the center, thinning to 20 μ at the margin; thecium 100–105 μ tall, surface very uneven; paraphyses conglutinate, thick-walled, dichotomous above the asci, tips not enlarged in the brownish, epithecial gel, filled with minute granules; asci 1(–2)-spored, cylindric-clavate, about 100 × 30 μ; ascospores hyaline to slightly brownish, without a halo, muriform, 43–56(–66) × 16–21(–23) μ.

Phyllopsoraceae

Thallus squamulose to subfoliose, often somewhat erect, attached to the substrate by rhizinae; upper cortex well developed; algae protococcoid. Apothecia rounded, sessile; amphithecium absent, parathecium light or dark; paraphyses unbranched; ascospores hyaline, unilocular or septate.

Although there is no clear differentiation of primary thallus and podetia which one finds in the Cladoniaceae, this family seems much closer to it than to the Lecideaceae. Only two genera are known: *Phyllopsora* with unilocular ascospores, and *Psorella* with 4–16-locular ascospores. Our material belongs in the former genus.

PHYLLOPSORA

Phyllopsora Müll. Arg., Bull. Herb. Boissier 2:append. 1:11, 45. 1894.
?*Psoromidium* Stirton, Proc. Phil. Soc. Glasgow 10:304. 1877.

Type: not designated but *P. parvifolia* (Pers.) Müll. Arg., one of the best-known species, may be chosen. *Psoromidium* Stirton was based on *P. Wellingtonii* Stirton.

Characters of the family: ascospores unilocular, long-ellipsoid, hyaline.

1. Squamules not long white-ciliate; fertile 2
1. Squamules long, snowy-white ciliate, upper surface pale yellowish; sterile; Usambara..... *P. pannosa* Müll. Arg.
2. Ascospores very long-ellipsoid, 10–12 × 2.5–3.5 μ; Togoland..... *P. Buettneri* (Müll. Arg.) Zahlbr.
2. Ascospores relatively short ellipsoid, 5–7.5 × 3.5–5 μ; Usambara..... *P. brachyspora* Müll. Arg.

Phyllopsora Buettneri Zahlbr., Cat. Lich. Univ. 4:396. 1926.

Psora Buettneri Müll. Arg., Bot. Jahrb. [Engler] 15:506. 1893.
Lecidea Buettneri Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges. 1893/4:246. 1895.

Type: Togoland, Bismarcksburg, corticole, R. Buettner.

Hypothallus fuscous black, almost completely covered by light yellowish olive squamules, imbricate, less than 1 mm. broad, deeply lobed, the lobes becoming erect isidia, so that the whole thallus appears isidiose and minutely granular-sorediose. Apothecia convex, immarginate, constricted below into a substipitate base, 0.35 mm. broad, 0.25 mm. tall, disc cinnamon rufous; parathecium of hyaline, thick-walled, densely woven hyphae 3–4 μ in diameter, containing a few small colonies of *Trebouxia* cells 6–8 μ in diameter; hypothecium 70 μ thick, of thick-walled, vertical hyphae, very dark brown next the thecium, shading to hyaline next the base; thecium 25 μ tall; paraphyses conglutinate, tips not thickened, somewhat dichotomous in the upper portion; asci cylindric, 8-spored, about 20 $\times$ 8 μ; ascospores fascicled, unicellular, long-ellipsoid, 10–12 $\times$ 2.5–3.5 μ.

Some ascospores contain 3–5 large oil droplets, when the ascospores appear 3–5-septate and might lead one to look for the species in *Psorella*.

Gold Coast: Tafo, West African Research Institute, on *Theobroma*, C. A. Thorold 155.

Nigeria: Ondo Province, Aponmu near Akure, on *Theobroma*, C. A. Thorold 173.

Lecanoraceae

Thallus crustose, uniform or with effigurate margins, rarely dwarf-fruticose, branched, attached to the substrate by hyphae of the hypothallus or of the medulla, without rhizinae; heteromerous (except in *Harpidium*); ecorticate or corticate; algae *Protococcus* or *Trebouxia*. Apothecia immersed in the thallus, to sessile, round; amphithecium well developed; parathecium very poorly developed or lacking; hypothecium hyaline or brownish, usually with algae below it; paraphyses unbranched (except in *Ochrolechia* and *Phlyctidia*); asci 8–32-spored; ascospores hyaline (brownish in some species of *Myxodictyon*), unilocular, septate or muriform.

1. Thallus homoeomerous, pseudoparenchymatous; ascospores sickle-shaped; known only from Europe ..... *Harpidium* Koerb.
1. Thallus heteromerous, plectenchymatous 2
2. Ascospores unilocular 5
2. Ascospores bilocular 8
2. Ascospores 4–pluri-locular 10
2. Ascospores muriform 4
3. Paraphyses unbranched or sparingly dichotomous above the asci 3
3. Paraphyses branched, sparse in the thecial gel; ascospores large but relatively thin-walled [perhaps belongs in the Pertusariaceae] ..... *Ochrolechia* Mass.
4. Thallus not bright yellow to orange; spermatia acicular, straight or curved ..... *Lecanora* Ach.
4. Thallus bright yellow or orange; spermatia ellipsoidal, straight ..... *Candelariella* Müll. Arg.
5. Ascospores ellipsoid to subcylindric; spermatiophores unbranched, spermatia terminal 6
5. Ascospores fusiform; spermatiophores branched, septate, spermatia lateral 7
6. Thallus gray or brown; spermatia straight or curved, acicular ..... *Lecania* Mass.
6. Thallus bright yellow to orange; spermatia ellipsoidal, straight ..... *Candelariella* Müll. Arg.
7. Thallus crustose, uniform ..... *Icmadophila* Trev.
7. Thallus effigurate ..... *Solenopsora* Mass.
8. Thallus ecorticate; apothecia immersed 9
8. Thallus corticate; apothecia sessile ..... *Haematomma* Mass.
9. Paraphyses unbranched ..... *Phlyctella* Krmphbr.
9. Paraphyses branched and anastomosing ..... *Phlyctidia* Müll. Arg.
10. Apothecia immersed in the thallus, small ..... *Phlyctis* Fw.
10. Apothecia sessile, large ..... *Myxodictyon* Mass.

LECANORA

LECANORA Ach., Lichenogr. Univ. 77. 1810.

Type: not designated.

Thallus crustose, uniform, effigurate, rarely squamose or dwarf-fruticose, attached to the substrate by the hyphae of the hypothallus or of the medulla, without rhizinae, heteromerous; ecorticate or corticate; algae protococcoid. Apothecia immersed or sessile, circular; amphithecium well developed; parathecium usually absent or poorly developed; hypothecium hyaline or brownish; paraphyses unbranched, free; asci normally 8-spored, rarely 16–32-spored; ascospores hyaline, ellipsoidal to spherical, rarely reniform. Spermatia cylindric to acicular, straight or curved.

The above generic description is based on the concept of Zahlbruckner. Of the six sections into which he divided the genus, I would recognize four as distinct genera, leaving *Eulecanora* and *Placodium*. Our material belongs in *Eulecanora,* of which the key to tropical African species follows.

1. Asci 16-spored; ascospores 8–11 × 6–8 μ, disc pale flesh color; apothecia about 0.7 mm.; thallus yellowish ashy, granular, wrinkled, margin subarachnoid; Kenya ..... *L. pleospora* Müll. Arg.
1. Asci 8-spored 2
   2. Disc white to pale cervine; thallus white 3
   2. Disc yellow to cinnamon or yellowish fleshcolor 4
   2. Disc reddish flesh color 7
   2. Disc fuscous to reddish fuscous 10
   2. Disc black, at least when dry 19
3. Thallus pale gray, margin radiate-rimose with white plumose fibrils; apothecia small, angular from mutual pressure; ascospores 9–11.5 × 6–7.5 μ; on *Euphorbia;* Ruanda ..... *L. poliothallina* Lindau
3. Thallus white or reddish, tartareous, obsoletely radiate, margin inconspicuous; apothecia 1–2 mm.; ascospores 9–12 × 5–7 μ; saxicole; St. Helena ..... *L. Sanctae-Helenae* Müll. Arg.
3. Thallus verruculose, black-margined; apothecia 0.3–0.4 mm.; ascospores 11–13 × 5 μ; corticole; Angola ..... *L. Monodorae* Vainio
   4. Thallus white to ashy, margin indistinct, verruculose; apothecia 0.7–1 mm.; ascospores 12–16 × 6–8 μ; corticole; Kenya ..... *L. flavidocarnea* Vainio
   4. Thallus white-pruinose, margin slightly radiate-fibrillose, smooth; apothecia 0.5–0.6 mm.; ascospores 8–9 × 6–7 μ; corticole; Nyasaland ..... *L. Brassii* Dodge
   4. Thallus yellowish to greenish 5
5. Ascospores slender, 13 × 4 μ; apothecia 0.7–1.2 mm.; thallus verruculose; Mozambique ..... *L. carneosulphurea* Vainio
5. Ascospores broader, 7–14 × 5–8 μ 6
   6. Thallus margin black; disc yellow-fleshcolor to livid, apothecial margin granulose; ascospores 9–11 × 6–7 μ; saxicole; Eritrea ..... *L. polytropoides* Zahlbr.
   6. Thallus margin fibrillose, pale; apothecia 1.5–2 mm.; margin thick, disc pale yellow; ascospores 12–14 × 6–7.5 μ; corticole; Usambara ..... *L. usambarensis* Müll. Arg.
   6. Thallus margin indefinite, thallus granulose-verrucose to squamulose, disc yellow to slightly brownish, apothecia 0.7–1 mm., margin thin; ascospores 10.5–12 × 5–6 μ; terricole; Ruanda ..... *L. lateritica* Lindau
7. Disc pruinose 8
7. Disc not pruinose; thallus white to pale glaucous 9
   8. Disc grayish red; apothecia 0.75–1 mm.; ascospores 9.5–11 × 5.8–6 μ; terricole; Ruanda ..... *L. laterigena* Lindau
   8. Disc dark flesh color; apothecia 0.4–0.8 mm.; ascospores 9–14 × 5–7 μ; corticole; Angola ..... *L. leprosa* v. *carneola* (Vainio) Zahlbr.
9. Disc livid flesh color, margin granulose; ascospores 9–11 × 6–7 μ; saxicole; Eritrea ..... *L. polytropoides* Zahlbr.
9. Disc flesh-rufous, margin very thin; crenulate; ascospores 10–12 × 6–7 μ; corticole; Angola ..... *L. leprosa* v. *rufocarnea* (Vainio) Zahlbr.

9. Disc dark fuscous, margin entire; corticole; Mozambique.....*L. ecoronata* Vainio
9. Disc flesh color, margin thin, entire to slightly crenulate; apothecia 0.2–0.5 mm.; ascospores 10–14 × 6–10 μ; corticole; Kenya.....*L. corallina* Hue
9. Disc pale rufous, margin thin; apothecia 0.5–0.7 mm.; ascospores 11–13 × 6–7 μ; corticole; French Equatorial Africa.....*L. callimorpha* Hue
10. Thallus obsolete; apothecia 0.3–0.6 mm.; margin thin, entire; ascospores 10–13 × 6–7.5 μ; saxicole; Kenya .....*L. subcongruens* Müll. Arg.
10. Thallus yellowish 11
10. Thallus white to ashy 13
11. Thallus rimulose, thin; apothecia 1–1.5 mm.; medulla yellowish; ascospores 9–11 × 5–5.5 μ; saxicole; Socotra .....*L. socotrana* Müll. Arg.
11. Thallus rimose-areolate, black-margined, sulfur-tartareous, 1 mm. thick; medulla yellowish; apothecia substipitate, 0.5 mm.; ascospores 8–9 × 6 μ; saxicole; Usambara .....*L. pedata* Zahlbr.
11. Thallus granular or glebous; apothecial margin tumid, entire.....12
12. Apothecia 0.8(–1.5) mm.; ascospores 8 × 5.5–6 μ; thallus ashy to citrine drab; corticole; Belgian Congo .....*L. aequinoctialis* Stzbgr.
12. Apothecia 0.4 mm.; ascospores 8–9 × 4–5 μ; thallus ashy yellow to ashy; saxicole; Eritrea .....*L. africana* Zahlbr.
12. Apothecia 0.2–0.5 mm.; ascospores 10–12 × 4–5 μ; thallus ochroleucous; terricole; Eritrea .....*L. granulescens* Jatta
12. Apothecia 0.5–0.8 mm.; ascospores 10–13 × 6–9 μ; thallus sulfur greenish; corticole; Kenya .....*L. sabulosa* Steiner
13. Thallus margin white-byssine 14
13. Thallus margin black 15
13. Thallus margin inconspicuous (or not described).....17
14. Thallus glebulose, granular; apothecial margin flexuous; ascospore size not given; corticole; Abyssinia .....*L. subfusca* v. *glebulosa* Fw.
14. Thallus wrinkled, granulose; apothecia 0.5–0.75 mm.; margin entire or subcrenulate; ascospores 15 × 7 μ; corticole; Usambara....*L. subfusca* v. *leucoblephara* Müll. Arg.
15. Thallus granulose to glebulose, ashy to citrine drab; apothecia 0.8 mm., becoming angular in age; ascospores 8 × 5.5–6 μ; corticole; Congo.....*L. aequinoctialis* Stzbgr.
15. Thallus rimulose, white; apothecia up to 0.5 mm.; ascospores 10–15 × 6–7 μ; saxicole; Angola (may belong in *Aspicilia*).....*L. homaloplaca* Nyl.
15. Thallus rimulose-aerolate; apothecia 0.4–0.5 mm.; ascospores 8–10 × 4–5 μ; saxicole.....16
16. Thallus ashy to ashy yellowish; ascospores 8–9 × 4–5 μ; Eritrea.....*L. africana* Zahlbr.
16. Thallus white; ascospores 8–10 × 4.5–5 μ; Kenya.....*L. leucoplaca* Vainio
17. Thallus smooth or verrucose; apothecia 0.6 mm.; ascospores 10–14 × 6.5–7.5 μ; corticole; Kenya .....*L. rubiniza* Steiner
17. Thallus rimulose-aerolate; apothecia 0.4–0.6 mm.; ascospores 16–20 × 4 μ; corticole; Eritrea .....*L. triguttulata* Jatta
17. Thallus granulose 18
18. Ascospores 8–12 × 4–6 μ; apothecia 0.3–0.6 mm.; Abyssinia....*L. subfusca* v. *ferax* Müll. Arg.
18. Ascospores 8–14 × 5–7 μ; São Thomé and Ilha Principe.....*L. tropica* Zahlbr.
19. Thallus white or ashy, granulose 20
19. Thallus yellowish 21
20. Thallus margin white, fibrous; apothecia 0.5 mm.; ascospores 13–18 × 7–8 μ; corticole; Angola .....*L. fibrosa* Müll. Arg.
20. Thallus margin inconspicuous; apothecia 1.5 mm.; ascospores unknown; corticole; Usambara .....*L. subfusca* v. *melaleuca* Müll. Arg.
21. Hypothecium orange rufous; apothecia 1–1.5 mm.; ascospores 17–20 × 5–6 μ; corticole; Kenya .....*L. flavidonigrans* Müll. Arg.
21. Hypothecium black; ascospores 8–10 × 7–8 μ; saxicole; Socotra.....*L. notha* Müll. Arg.
21. Hypothecium hyaline; apothecia 0.5–1 mm.; not corticole.....22
22. Epithecium dark green; thallus yellow ochre; ascospores unknown; saxicole; Usambara .....*L. flavochracea* Müll. Arg.
22. Epithecium grayish black; thallus stramineous; ascospores 11–12 × 6.5–7 μ; on soil; Ruanda .....*L. latericola* Lindau

LECANORA **Brassii**, Dodge, sp. nov.

Type: Nyasaland, Kasungu Hill, corticole, L. J. Brass 17458a.

Thallus indeterminatus, 44 μ crassitudine, albus, pruinosus, margine inconspicue radiato-fibrilloso; ecorticatus; algae *Trebouxia*, cellulis 6 μ diametro;

medulla deest aut ad 15 μ crassitudine hyphis subverticalibus magnis cum crystallis hyalinis. Apothecia 0.5–0.6 mm. diametro, margine crasso, elevato, disco pallide flavo-carneo, dense pruinoso; amphithecium 105–120 μ crassitudine, cellulis algarum dense dispositis; parathecium deest; hypothecium 40 μ crassitudine, hyalinum, hyphis 3 μ diametro dense contextum; thecium 55–60 μ altitudine; paraphyses tenues, pachydermeae, apicibus clavatis; asci clavati, juventute apicibus incrassatis, protoplastis submamillatis, 42 $\times$ 12 μ; ascosporae octonae, imbricatim monostichae, dein subdistichae, hyalinae, uniloculares, late ellipsoideae, 8–9 $\times$ 6–7 μ.

Thallus crustose, indeterminate, margin inconspicuously radiate-fibrillose, white, pruinose, not changing color when moistened; cortex not differentiated; algae *Trebouxia*, cells 6 μ in diameter, in places completely filling the thallus, in others leaving a medulla, 15 μ thick, of coarse, closely woven, subvertical hyphae, penetrating between the cork cells, often with large hyaline crystals. Apothecia 0.5–0.6 mm. in diameter, margin thick, elevated, disc pale yellowish flesh colored, densely pruinose; amphithecium 105–120 μ thick, of densely packed algae; parathecium absent; hypothecium 40 μ thick, hyaline, of densely woven hyphae 3 μ in diameter; thecium 55–60 μ tall; paraphyses slender, relatively thick-walled, tips slightly clavate, epithecial gel hyaline with minute crystals (brownish in thick sections); asci clavate, tips thickened when young, protoplasts somewhat mamillate, 8-spored, about 42 $\times$ 12 μ; ascospores imbricately monostichous, becoming subdistichous, hyaline, unilocular, broadly ellipsoidal, 8–9 $\times$ 6–7 μ.

LECANORA AEQUINOCTIALIS Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges. 1888/9:218. 1890.

Type: Belgian Congo, Banana, at mouth of Congo River, corticole, P. Hesse.

Thallus epiphloeodal, verrucose to glebulose, thickness variable, up to 160 μ, citrine drab with a narrow black margin; cortex about 8 μ thick, gelified, of periclinal hyphae, often disappearing on the tops of the glebulae and revealing the sulfur-colored interior, but not truly sorediose; algae protococcoid?, somewhat yellowish green, cells subspherical, 3–5 μ in diameter, mostly arranged in vertical rows and filling the smaller warts, while forming a layer about 40 μ thick around the larger, hollow warts which contain a few short, loosely tangled, subvertical filaments of *Stigonema;* medulla not differentiated. Apothecia innate in the tops of the glebulae, becoming sessile at maturity, round with an entire margin at first, then becoming lobulate from the confluence of several apothecia with a somewhat crenulate margin, 0.8 (–1.5) mm. in diameter, disc plane, warm sepia becoming convex when moist and appearing immarginate; amphithecium 55 μ thick, of the same structure as the thallus; parathecium 55 μ thick in the center below the hypothecium, thinning to 20 μ at the margin, very dark brown (black in thick sections); hypothecium not clearly differentiated from the parathecium; thecium about 55 μ tall; paraphyses conglutinate, slender, tips not thickened in the brownish epithecial gel; asci clavate, thick-walled when young, 8-spored, about 40 $\times$ 8 μ; ascospores hyaline, unilocular, relatively thick-walled, subspherical, 8 $\times$ 5.5–6 μ.

Stizenberger's description is brief, but our material agrees well with the characters recorded.

Nigeria: Ondo Province, Owena, on *Theobroma,* C. A. Thorold 132; Ipetu, on *Theobroma,* C. A. Thorold 130; Ina near Ibadan, on *Theobroma,* C. A. Thorold 129.

OCHROLECHIA

OCHROLECHIA Mass., Ricerch. Autonom. Lich. Crost. 30. 1852.

Lecanora sect. *Ochrolechia* Flagey, Mém. Soc. Emul. Doubs, 272. 1886.

Type: not designated, based on *Verrucaria parella* Wigg. and *Lichen pallescens* L.

Thallus crustose, uniform, attached to the substrate by hyphae of the hypothallus or of the medulla, without rhizinae, ecorticate or with a cortex of erect or irregularly woven, septate, gelified hyphae; algae protococcoid; medulla of thin-walled hyphae; soredia frequent. Apothecia immersed at first, then sessile, constricted at the base; amphithecium well developed; hypothecium hyaline; paraphyses branched and anastomosing in the thecial gel (similar to those of the Pertusariaceae); asci 2–8-spored; ascospores hyaline, ellipsoidal, unilocular, large. Spermogonia in verrucae, cavity often labyrinthiform; spermatiophores unicellular; spermatia long-cylindric, straight.

OCHROLECHIA **palmicola** Dodge, sp. nov.

Type: Sierra Leone, Sefadu (Gbense), on trunk of *Elaeis guineensis,* P. Adames, comm. F. C. Deighton M4750.

Thallus epiphloeodes, verrucosus aut rugosus, subrimoso-areolatus, albidus, 300 μ crassitudine, laevior continuiorque ad marginem lobatum minute plumoso-fibrillosum; cortex 25 μ crassitudine, hyphis conglutinatis periclinalibus 2–2.5 μ diametro, inferne tenuioribus intertextisque; stratum algarum 25 μ crassitudine, protococcoideum, cellulis 5–6 μ diametro; medulla 130 μ crassitudine, hyphis 2–3 μ diametro laxe intertextis, granulis minutis aut crystallis inspersis, dein stratum alterum inter strata cellularum suberosarum 80–105 μ crassitudine, structura simili; soralia elevata, 1 mm. diametro, soredia granularia, pallide sulfurea, 50–60 μ diametro. Apothecia sessilia, urceolata, margine integro, 1 mm. diametro, disco vinaceo-alutaceo, albo-pruinoso; amphithecium inferne 125 μ crassitudine, superne ad 50 μ tenuescens; cortex et stratum algarum ut in thallo, medulla hyphis hyalinis conglutinatis 4 μ diametro; hypothecium 25 μ crassitudine, hyphis tenuibus, periclinalibus super stratum algarum; thecium 200–210 μ altitudine; paraphyses tenues, dichotome ramosae et sparse anastomosantes; asci cylindrico-clavati, 175 $\times$ 65 μ, pachydermei, usque ad 8 μ crassitudine; ascosporae octonae, hyalinae, leptodermeae, protoplastis granularibus, uniloculares, 55 $\times$ 24 μ.

Thallus epiphloeodal, verrucose or wrinkled, somewhat rimose-aerolate, whitish, smoother and continuous toward the lobed, white, minutely plumose-fibrillose margin, 300 μ thick; cortex 25 μ thick, of conglutinate, periclinal hyphae 2–2.5 μ in diameter, more slender and interwoven below; algal layer 25 μ thick, proto-

coccoid, cells 5–6 μ in diameter; medulla about 130 μ thick above the uppermost layer of bark cells, of loosely woven hyphae 2–3 μ in diameter, inspersed with minute granules or crystals, below which is another layer 80–105 μ thick between the bark cells, of similar structure; soralia elevated, 1 mm. in diameter, soredia coarsely granular, pale sulfur-colored, about 50–60 μ in diameter. Apothecia sessile, urceolate, margin entire, 1 mm. in diameter, disc vinaceous buff, white-pruinose; amphithecium 125 μ thick below the hypothecium, thinning to 50 μ at the somewhat inflexed top; cortex and algal layer as in the thallus, medulla of vertical, conglutinate, hyaline hyphae about 4 μ in diameter, resting on the algal layer; thecium 200–210 μ tall; paraphyses slender, dichotomously branched and occasionally anastomosing in the thecial gel; asci cylindric-clavate, 8-spored, 175 $\times$ 65 μ, wall 8 μ thick when the ascospores are mature; ascospores thin-walled, hyaline, unilocular, protoplast granular, 55 $\times$ 24 μ.

Sierra Leone: Sefadu (Gbense), on trunk of *Elaeis guineensis*, P. Adames, comm. F. C. Deighton M4750, fertile, type, 4754a, sterile.

HAEMATOMMA

HAEMATOMMA Mass., Ricerche Autonom. Lich. Crost. 32. 1852.

Loxospora Mass., Ricerche Autonom. Lich. Crost. 137. 1852.
Ophioparma Norm., Nyt Mag. Naturvidensk. 7:230. 1853.

Type: *H. vulgare* Mass. (*Lecanora haematomma* Ach.). *Lichen ventosus* L. was also transferred here. *Loxospora* was based on *Lecanora elatina* Ach., probably on immature material as Massolongo failed to see the septa and reported the ascospores as unilocular. *Ophioparma* Norm. was based on *Lichen ventosus* L., *L. haematomma* Ehrh. and *L. puniceus* Smith.

Thallus crustose (to squamulose in *H. dactylopholis* (Nyl.) Zahlbr.), corticate, of subvertical, conglutinate, thin-walled hyphae; algae protococcoid; medulla of loosely woven hyphae. Apothecia usually sessile, rarely subimmersed; amphithecium present; parathecium present or absent; hypothecium hyaline; asci 8-spored; ascospores hyaline, fusiform to acicular, septate, 4–pluri-locular, protoplasts cylindric. Spermogonia in thalline warts, dark about the ostiole; spermatia cylindric, straight or curved.

1. Thallus imbricate-squamulose (resembling that of the Phyllopsoraceae); apothecia 0.5–1 mm.; ascospores 4-locular, 22–32 $\times$ 2 μ; São Thomé.....*H. dactylopholis* (Nyl.) Zahlbr.
1. Thallus crustose 2
2. Apothecia immersed or nearly so, more or less irregular; disc reddish to testaceous; Kenya .....*H. subarthonioideum* (Zahlbr.) Hillm.
2. Apothecia sessile 3
3. Disc densely white-pruinose, margin subcrenulate; Nyasaland.....*H. Brassii* Dodge
3. Disc not pruinose, blood-red, margin entire; apothecia often aggregated and angular from mutual pressure; Abyssinia .....*H. similis* Bagl.

HAEMATOMMA Brassii Dodge, sp. nov.

Type: Nyasaland, Kasungu Hill, 1100 m., corticole, L. J. Brass 17458a.

Thallus epiphloeodes, continuus, laevis vel minutissime verruculosus, subrimulosus, subpruinosus, albidus, 250 μ crassitudine, margine indistincto; cortex

15 μ crassitudine, hyphis subverticalibus tenuibus; stratum algarum 75 μ crassitudine, cellulis *Trebouxiae*, 6–8 μ diametro, sphaericis vel subangulosis pressione mutua; medulla 160 μ crassitudine, hyphis subverticalibus laxe intertextis, 3 μ diametro. Apothecia rotundata, basi constricta, juventute urceolata, margine elevato, crasso, integro, dein disco plano, dense albo-pruinoso, margine subcrenulato; amphithecium inferne 105 μ crassitudine, superne ad 30 μ tenuescens, cortex et stratum algarum ut in thallo, medulla deest; hypothecium conicum, substipitatum dein subpulvinare, centro 300 μ crassitudine, ad marginem thecii tenuescens, hyphis verticalibus conglutinatis, rare cum coloniis algarum ad 100 $\times$ 40 μ; thecium circa 80 μ altitudine; paraphyses tenues apicibus non incrassatis; asci stipitati, clavati, apicibus incrassatis, 72 $\times$ 16 μ; ascosporae octonae, hyalinae, aciculares, multiloculares, 40 $\times$ 4 μ.

Thallus epiphloeodal, continuous, smooth or very minutely verrucose, slightly rimulose and pruinose, 250 μ thick, white, margin indistinct; cortex 15 μ thick, of slender, subvertical hyphae; algal layer 75 μ thick, with occasional colonies in the medulla, *Trebouxia*, cells 6–8 μ in diameter, spherical or somewhat angular from mutual pressure; medulla 160 μ thick, of loosely woven subvertical hyphae 3 μ in diameter. Apothecia circular, constricted at the base, urceolate at first, margin elevated, thick, entire, disc concave, at maturity margin becoming subcrenulate and disc plane, densely white-pruinose; amphithecium 105 μ thick below, thinning to 30 μ above, of the same structure as the thallus but lacking the medulla on the sides of the thecium; hypothecium conic, substipitate, becoming somewhat pulvinate, 300 μ tall in the center, thinning to the margin of the thecium, of vertical conglutinate hyphae, occasionally with large, ellipsoid colonies of algae up to 100 $\times$ 40 μ which may push up into the base of the thecium, resembling internal cephalodia, but the algae clearly *Trebouxia;* thecium not sharply differentiated from the hypothecium, about 80 μ tall; paraphyses slender, septate, tips not thickened in the epithecial gel; asci stipitate, clavate, 8-spored, about 72 $\times$ 16 μ, tips thickened, protoplasts hemispheric above; ascospores acicular, multilocular, hyaline, 40 $\times$ 4 μ.

HAEMATOMMA DACTYLOPHOLIS Zahlbr., Cat. Lich. Univ. 5:765. 1928.

Lecanora dactylopholis Nyl., Flora 69:172. 1886.

Type: São Thomé, Bom Successo, 1050–1250 m., A. Moller.

Thallus epiphloeodal, imbricate-squamulose, squamules whitish, 0.5 mm. in diameter, white-puberulent below, often with dactyloid fibrils above, up to 1–2 mm. long, crowded. Apothecia 0.5–1 mm. in diameter, constricted at the base, disc pale testaceous or pale yellowish; amphithecium crenate; asci 8-spored; ascospores acicular, 3-septate, 22–32 $\times$ 2 μ; paraphyses not very distinct, epithecium and hypothecium hyaline.—Nylander.

Only a single small thallus, with 8 apothecia on a small twig, was available for study. The thallus was probably somewhat immature, small discrete squamules on a black hypothallus, up to 0.5 mm. in diameter, margins dactyloid, ascending

but not reaching the dimensions recorded by Nylander, about 130 μ thick; cortex 16 μ thick, of erect hyphae 2–3 μ in diameter; algal layer 35 μ thick, *Trebouxia*, cells 6–8 μ in diameter; medulla 55 μ thick, of loosely woven vertical hyphae; hypothallus 25 μ thick, of periclinal hyphae 6–8 μ in diameter, septate, somewhat brownish, with occasional short rhizinal branches. Apothecia 0.5–1 mm., constricted at the base; amphithecium crenate, 130 μ thick below the thecium, 80 μ thick on the sides where the algal cells are more crowded and the medulla is absent; no parathecium; hypothecium 55 μ thick, of slender, densely woven hyphae; thecium 60 μ tall; paraphyses slender, conglutinate, tips not thickened in the pale epithecial gel; asci subcylindric, 8-spored, about 30 $\times$ 8 μ; ascospores 4-locular, acicular, hyaline, about 22 $\times$ 2 μ.

Sierra Leone: Sugar Loaf Mountain, 645–775 m., on twig, F. C. Deighton M4441b.

Parmeliaceae

Thallus foliose, resupinate to erect and almost fruticose, but always dorsiventral, usually attached to the substrate by rhizinae; usually corticate on both surfaces (ecorticate below in *Anzia* and *Pannoparmelia*); algae protococcoid, lower surface nearly nude or more usually covered with rhizinae, which rarely anastomose to form a spongy hypothallus (*Anzia* and *Pannoparmelia*). Apothecia circular, sessile to short-stipitate; amphithecium well developed; parathecium absent or inconspicuous; paraphyses branched or unbranched; asci 8-spored (16–32-spored in *Anzia* and *Candelaria*, 2–4-spored in *Menegazzia*); ascospores unilocular, hyaline (septate in *Megalopsora* and *Physcidia*).

Of the dozen genera, all but *Parmelia* are characteristic of subarctic and temperate zones, or are endemic on other continents.

PARMELIA

Parmelia Ach., Meth. Lich. 153. 1803.

Imbricaria Ach., K. Vetensk. Akad. Nya Handl. 15, 250. 1794.
Physcia S. F. Gray, Nat. Arr. Brit. Pl. 1:455. 1821, *non* Schreber, 1791.

Type: *Lichen saxatilis* L.

Thallus foliose, appressed or ascending, laciniate with rounded or linear lobes, often imbricate; upper surface often sorediose or isidiose, lower surface either darker or lighter than the upper, usually covered with rhizinae except at the margins (absent in subg. *Hypogymnia*); upper cortex of vertical hyphae forming a pseudoparenchyma, lower cortex usually similar (but of periclinal hyphae in the Antarctic sect. *Physcioideae*); medulla of loosely woven, mostly periclinal hyphae; algae protococcoid. Apothecia on the upper surface, never marginal, sessile or short-stipitate, disc concave to flat, often chestnut brown; amphithecium prominent; parathecium poorly developed or absent; hypothecium with algae below; paraphyses imbedded in a gel, usually somewhat branched above the asci, septate, tips clavate or pointed; asci clavate, usually 8-spored; ascospores hyaline, unilocular. Spermogonia immersed in the surface of the thallus or amphithecium,

spherical or pyriform, opening by blackened ostioles; wall black or dark brown above, light brown to hyaline below; spermatiophores simple or branched; spermatia cylindric or fusiform, often slightly constricted in the middle.

Only the sections *Hypothrachyna* and *Amphigymnia* are represented in our collections, although the section *Xanthoparmelia* has been reported from our area.

HYPOTRACHYNA

1. Thallus both isidiose and sorediose, rimulose, pale glaucous; corticole; Socotra.....*P. tiliacea* v. *rimulosa* Müll. Arg.
1. Thallus isidiose but not sorediose 2
1. Thallus sorediose but not isidiose 6
1. Thallus neither isidiose nor sorediose 11
2. Thallus lobes broad, isidioid dissected 3
2. Thallus lobes narrow, 3–5 mm. 4
3. Thallus glaucous, center also isidiose; Usambara.....*P. cetrata* v. *subisidiosa* Müll. Arg.
3. Thallus pale yellow, center not isidiose; apothecia 6–10 mm.; ascospores 22–25 × 12–15 μ; Socotra .....*P. Schweinfurthii* Müll. Arg.
4. Surface scrobiculate and isidiose, margins microphylline; Usambara.....*P. revoluta* v. *ambigua* Stein
4. Surface not scrobiculate nor margins microphylline 5
5. Lobes discrete, ashy white; medulla K yellow then red, C pale yellow; saxicole; French Guinea and Ivory Coast .....*P. laevigatoides* des Abb.
5. Lobes concrescent, pale glaucous; medulla K—, C—; corticole; Angola.....*P. concrescens* Vainio
6. Ends of lobes reticulate-rimose with soredia along the cracks, center with scattered or confluent soredia; Usambara .....*P. tenuirima* f. *sorediata* Müll. Arg.
6. Thallus not as above 7
7. Soredia granular, covering large areas; thallus pale glaucous, under-side yellowish, center pale fuscous; apothecia 5–10 mm.; ascospores 16–18 × 10–12 μ; Kenya.....*P. Hanningtoniana* Müll. Arg.
7. Soredia in discrete or confluent soralia 8
8. Margins ciliate; medulla C— 9
8. Margins without cilia 10
9. Soralia only in central portion of thallus; medulla K—; sterile; Eritrea.....*P. asmarana* Vainio
9. Soralia on lobes, margins confluent, sorediose, lobulate and microphylline; medulla K yellow, sometimes reddening in spots; apothecia 4–6 mm.; ascospores 9–15 × 6–8.5 μ; Usambara .....*P. usambarensis* Stnr. & Zahlbr.
10. Soralia few, laciniae longer and narrower than in the species; over mosses; Kenya .....*P. vicinior* v. *bryophila* Cengia-Sambo
10. Soralia abundant in the center with a few on the margins; thallus 10(–15) cm. in diameter, pale ashy, lobes 3–5(–7) mm. wide; medulla K—, C pink; sterile; both saxicole and corticole; Ivory Coast.....*P. Mangenoti* des Abb.
11. Thallus black below 12
11. Thallus pale fuscous, white-spotted below, ashy-glaucous above; ultimate lobes 3.5 mm. wide and long; ascospores 7–13 × 5–7.5 μ; Uganda.....*P. leptasca* Stnr. & Zahlbr.
11. Thallus pale or white below 15
12. Lobes without cilia; fertile 13
12. Lobes with cilia, K very slowly and faintly yellow; medulla K yellow then orange red, C—, KC—; on roots of orchids; Uganda.....*P. orchidophila* Dodge
13. Apothecia small, 2.5–3.5 mm. in diameter.....14
13. Apothecia 2.5–6 mm.; medulla K—; ascospores 14–18 × 9–12 μ; Angola.....*P. coronata* v. *denudata* Vainio
13. Apothecia 7–12 mm.; medulla K yellow then red; ascospores 24–34 × 12–17 μ; Fernando Po .....*P. coilocarpa* Stirton
14. Medulla K yellow; Uganda .....*P. Scottii* Vainio
14. Medulla K yellow then rufous or blood-red; ascospores 7–11 × 5–7 μ; Kenya.....*P. sensibilis* Stnr. & Zahlbr.
15. Sterile and poorly described; Tanganyika 16
15. Fertile and well described 17
16. Growing over mosses on rocks.....*P. homalotera* v. *bryophila* Cengia-Sambo
16. Corticole .....*P. tiliacea* v. *hypoleuca* Müll. Arg.

17. Apothecia 6–15 mm. in diameter; lobes 2–6 mm., densely rhizinose below (as in *P. cervicornis* Tuck.); ascospores 8–9 × 3–4 μ; Uganda.....*P. ducalis* Jatta
17. Apothecia small, sessile; lobes 1–5 mm. broad; medulla C—.....18
18. Medulla K yellow; growing over mosses; Uganda.....*P. leucorhiza* Vainio
18. Medulla K yellow then red; apothecia 2–4 mm.; ascospores 9–12 × 6–7 μ; corticole; Angola .....*P. hypocraea* Vainio

PARMELIA **orchidophila** Dodge, sp. nov.

Type: Uganda, Western Province, Toro District, Nyinabitaba, in ridge forest, 2500 m., on roots of *Tridactyla bicaudata* (Lindl.) Schltr., H. A. Omastin 1184.

Thallus 3–4 cm. diametro, 95–100 μ crassitudine, olivaceo-alutaceus, crenatus, sinibus excisis, lobis rotundatis, lobulis ultimis ad 3 mm. latitudine, marginibus ciliatis, ciliis ca. 0.5 mm. longitudine, laevis, subimpressus, albo-reticulatus, subrimulosus, inferne niger, marginibus castaneis, rhizinis nigris, semel bisve dichotome ramosis, centro thalli 1 mm. longitudine, ad margines brevioribus, omnino tectus; cortex superior 12 μ crassitudine, pseudoparenchymaticus, hyphis verticalibus adglutinatis, cellulis leptodermaticis, 5 μ diametro, granulis minutis nubilatis; stratum algarum 16–20 μ crassitudine, cellulis protococcoideis 5 μ diametro; medulla 55 μ crassitudine, hyphis periclinalibus, pachydermeis, 3 μ diametro, minutis cum granulis albis vel pallide alutaceis (aurantiacis in partibus moribundis) nubilatis, dense contexta; cortex inferior niger, 12 μ crassitudine, pseudoparenchymaticus, cellulis 4 μ diametro; rhizinae 20 μ diametro. Sterilis.

Thallus 3–4 cm. in diameter, 95–100 μ thick, deep olive buff, K very slowly light yellow, lobes rounded, crenate, sinuses excised, ultimate lobules up to 3 mm. wide, margins with cilia about 0.5 mm. long, surface smooth, slightly impressed, white-reticulate, slightly rimulose, underside black with chestnut margins; rhizinae covering the whole under-surface, black, once or twice dichotomously branched, about 1 mm. long in the center of the thallus, shorter toward the margin; upper cortex about 12 μ thick, pseudoparenchymatous, hyphae vertical, cells thin-walled, 5 μ in diameter, nubilated with minute granules; algal layer 16–20 μ thick, of compactly interwoven, mostly periclinal hyphae, heavily incrusted with minute granules white to pale buff, becoming orange in moribund thalli, K yellow then orange red, C—, KC—; lower cortex black, about 12 μ thick, of very dark brown pseudoparenchyma, cells about 4 μ in diameter; rhizinae 20 μ in diameter. Sterile.

AMPHIGYMNIA

1. Thallus isidiose (for lobulate, lacerate and microphylline margins, see No. 11 below).....2
1. Thallus with sorediose margins 6
1. Thallus without isidia or soredia 9
2. Thallus white to ashy or pale olive buff; lobes rounded, 15 mm. or more broad.....3
2. Thallus yellow-green 5
3. Isidia confined to the center of the thallus, not marginal; Usambara.....*P. nitens* f. *isidiosa* Müll. Arg.
3. Isidia on upper surface, small; medulla K yellow then ferruginous; apothecia 2–4 mm.; ascospores 9–12 × 6–8 μ; Mozambique.....*P. isidiza* Nyl.
3. Isidia abundant on margins as well as upper surface.....4
4. Isidia up to 2 mm. tall, some coralloid; medulla K—, C—, KC—; thallus K, very slowly and faintly yellowing; Sierra Leone.....*P. lobulascens* v. *isidiosissima* Dodge
4. Isidia very short, 0.5 mm. tall, almost granular; medulla K—, C bright pink to blood red; thallus K promptly yellow; Ivory Coast.....*P. pseudotinctorum* des Abb.

5. Surface rugose with isidia in the depressions; Kenya.....*P. caperata* v. *isidiophora* Steiner
5. Surface not wrinkled; center densely isidiose; Tanganyika.....*P. ecaperata* Müll. Arg.
5. Surface pale yellow, isidiose and microphylline margins; apothecia 6–10 mm., disc pale fuscous; ascospores 22–25 × 12–15 μ; Socotra.....*P. Schweinfurthii* Müll. Arg.
6. Thallus margins with short cilia 7
6. Thallus margins without cilia 8
7. Thallus impressed, pale olive buff, rugulose; medulla K—, C pink, KC—; Uganda..... .....*P. subciliaris* (Vainio) Dodge
7. Thallus rugulose, glaucous; medulla K—, C—; Abyssinia.....*P. abessinica* v. *sorediosa* Müll. Arg.
8. Thallus pale glaucous; medulla K yellow, then red; ascospores 11–15 × 11–12 μ; Cormoro Archipelago .....*P. Hildenbrandtii* Krmphbr.
8. Thallus glaucous, K—; medulla C pink; Angola.....*P. olivetorum* v. *sorediosa* Vainio
8. Thallus pale ashy, medulla K—, C—; sterile; French Guinea and Ivory Coast..... .....*P. subcetrarioides* des Abb.
9. Thallus ciliate 10
9. Thallus without cilia 17
10. Margins lobulate-incised to lacerate; thallus K yellow.....11
10. Margins not lacerate nor lobulate 13
11. Medulla K yellow, C red; thallus lobes 1.5(–2) cm. wide; Cameroons.....*P. lobulascens* Steiner
11. Medulla K—, C— 12
12. Ascospores 19–30 × 12–17 μ; thallus pale lurid, unchanged when moist; peripheral lobes up to 2 cm. wide; Usambara.....*P. amaniensis* Stnr. & Zahlbr.
12. Ascospores 14–16 × 8–10 μ; thallus glaucous, surface rugulose; Abyssinia....*P. abessinica* Nyl.
12. Ascospores 8–14 × 6.5–8 μ; thallus ashy lurid, yellow green when moist; peripheral lobes 3–5 mm. wide; Kenya .....*P. neirobiensis* Stnr. & Zahlbr.
13. Thallus margin white or very pale below.....14
13. Thallus margin deep brown to black below.....15
14. Ascospores 11–15 × 11–12 μ; Usambara.....*P. Hildenbrandtii* v. *ciliata* Müll. Arg.
14. Ascospores 14–16 × 8–10 μ; Usambara.....*P. abessinica* f. *glabrior* Stnr. & Zahlbr.
14. Ascospores 20–24 × 10–13 μ; Abyssinia.....*P. Schimperi* Müll. Arg.
15. Medulla K—; ascospores 13–17 × 5.5–7 μ; Usambara.....*P. procera* Stnr. & Zahlbr.
15. Medulla K yellow 16
16. Ascospores 19–29 × 11.5–18 μ; Usambara.....*P. eurycarpa* Stnr. & Zahlbr.
16. Ascospores 13–19(–20) × 7–10 μ; Kenya.....*P. pedicellata* Steiner
16. Ascospores 16–20 × 9–11 μ; Kenya.....*P. uberrima* Hue
17. Ascospores 15–23 × 7–11 μ; Sudan.....*P. africana* Müll. Arg.
17. Ascospores 19 × 11 μ; along Zambesi River.....*P. Menyhartii* Steiner
17. Ascospores 8–15 × 7–10 μ 19
17. Ascospores 15–18 × 7–10 μ 18
18. Apothecia 2–11 mm.; ascospores 15–17 × 7–8.5 μ; along Zambesi River..... .....*P. zambesica* Müll. Arg.
18. Apothecia 4 mm.; ascospores 14–16 × 6–7 μ; Angola.....*P. olivetorum* v. *esorediata* Vainio
18. Apothecia 7–20 mm.; ascospores 15–18 × 8–10 μ; Angola.....*P. hyporysalea* Vainio
19. Apothecia perforate 20
19. Apothecia imperforate 21
20. Ascospores 11–12 × 6–7 μ; apothecia up to 3.5 cm. in diameter; Angola..... .....*P. Soyauxii* Müll. Arg.
20. Ascospores 10–15 × 7–9 μ; apothecia 10–11 mm. in diameter; Kenya..... .....*P. pedicellata* v. *subbullata* Stnr. & Zahlbr.
21. Apothecia 2–4 mm.; ascospores 11–15 × 7–9 μ; Kenya.....*P. modesta* Hue
21. Apothecia 4–7 mm.; ascospores 9–11 × 6–7 μ; Somaliland.....*P. somaliensis* Müll. Arg.
21. Apothecia 15 mm.; ascospores 10–12 μ long; Usambara.....*P. nitens* Müll. Arg.

PARMELIA LOBULASCENS Steiner var. **isidiosissima** Dodge, var. nov.

Type: Sierra Leone, Sefadu (Gbense), on trunk of *Elaeis guineensis*, P. Adames, comm. F. C. Deighton M4754.

Thallus foliosus, 10 cm. diametro, 135–150 μ crassitudine, pallide olivaceo-alutaceus, irregulariter lobatus, lobis aliis rotundatis, usque ad 15 mm. latitudine, marginibus laevibus, crispatis, sinibus irregulariter excisis, eciliatis, aliis 3–5 mm. latitudine, erectis, marginibus isidiosis aut lobulatis; isidiis granularibus aut

stipitatis, ramosis, 2 mm. altitudine, 0.5 mm. diametro; lobulis non isidiatis raris, 1 mm. longitudine, 0.5 mm. latitudine, basi subconstrictis; superficies inferna nigra, opaca, minute rugulosa, rhizinis centralibus, lobis latioribus marginibus castaneis aut pallide brunneis, laevibus, nitentibus; lobis angustioribus aut rugulosis et nigris ad marginem aut alba cum zona marginali, 1 mm. latitudine; cortex superior ca. 25 μ crassitudine, pseudoparenchymaticus, cellulis leptodermeis 6 μ diametro, ad superficiem minoribus; stratum algarum 15–25 (–40) μ crassitudine, protococcoideum, cellulis 6–8 μ diametro, minutis cum granulis; medulla ca. 65 μ crassitudine, hyphis pachydermeis, 3 μ diametro, laxe intertextis, granulis inspersis; cortex inferior niger, 15–25 μ crassitudine, pseudoparenchymaticus. Sterilis.

Thallus about 10 cm. in diameter, 135–150 μ thick, pale olive buff, K faint yellow, irregularly lobed, some lobes rounded, up to 15 mm. broad, margin smooth, crisped, sinuses irregularly excised, eciliate, other lobes only 3–5 mm. broad, more erect, margins isidiose or lobulate, bearing granular to stalked and branched isidia 2 mm. tall, 0.5 mm. in diameter; non-isidiose lobules very rare, about 1 mm. long, 0.5 mm. broad, somewhat constricted at the base; under-side black, opaque, minutely rugulose, rhizinae about 1 mm. long, black, confined to the central portion, attaching the thallus to the bark; broader lobes shading through chestnut to light brown at the margin, nearly smooth and shining; the narrower lobes either rugulose and black to the margin or abruptly white in a narrow zone about 1 mm. broad; upper cortex an irregular palisade about 25 μ thick, of thin-walled pseudoparenchyma, cells about 6 μ in diameter, somewhat smaller next the surface; algal layer 15–25 (–40) μ thick, protococcoid, cells 6–8 μ in diameter with abundant minute granules; medulla about 65 μ thick, of loosely woven, thick-walled hyphae about 3 μ in diameter, more periclinal and compact below, interstices nearly filled with granules, K—, C—, KC—; lower cortex black, 15–25 μ thick, pseudoparenchymatous. Sterile.

The relationship of this variety to *P. lobulascens* is somewhat doubtful, as I have found no short, marginal cilia; the upper surface is wholly smooth and the hyphae of the medulla are more loosely woven and slightly smaller than in Steiner's description.

PARMELIA PSEUDOTINCTORUM des Abb., Bull. Inst. Franç. Afrique Noire 13:973. 1951.

Type: Ivory Coast, Mt. Tonkoni (cercle de Man), 1150 m., saxicole, H. des Abbayes; Mankono (cercle de Séguela), on granite, H. des Abbayes; Séguela, on granite, H. des Abbayes.

Thallus at least 16–20 cm. broad, 135 μ thick, pale olive buff to deep olive buff where covered by isidia, K yellow, lobes rounded, 2.5 cm. broad, sinuses not excised, surface smooth to slightly undulate in the outer 1.5 cm., the rest densely isidiose, isidia 0.2 mm. tall, simple or dichotomous; under-side black, minutely verrucose and rugulose, margins shading to isabelline, very rarely almost white; rhizinae scarce, simple, tip densely branched, less than 1 mm. long; upper cortex about

16 μ thick, a palisade of thin-walled hyphae, 5–6 μ in diameter, forming a pseudoparenchyma, somewhat nubilated with grayish granules; algal layer 15–18 μ thick, cells protococcoid, 6–8 μ in diameter; medulla 75–80 μ thick, of densely woven, periclinal hyphae, thick-walled, 3 μ in diameter, nubilated with grayish granules, K—, C blood-red, KC—; lower cortex about 15 μ thick, black, pseudoparenchymatous, cells about 3 μ in diameter. Apothecia 15 mm. broad, 10 mm. tall, stalk 3 mm. in diameter, 7 mm. tall; exciple shallowly sulcate and scrobiculate, sparsely to densely isidiose, disc concave, imperforate, margin extending 0.5 mm. beyond the thecium, isidiose on the edge; amphithecium 40–175 μ thick near the margin, of the same structure as the thallus with an algal layer under the hypothecium as well as next the upper cortex; hypothecium about 25 μ thick, of slender, periclinal, gelified hyphae, appearing almost amorphous, hyaline; thecium 40 μ tall; paraphyses slender, dichotomous, coherent, tips not thickened in the pale brownish epithecial gel; asci clavate-cylindric, 30 $\times$ 13 μ, tips thickened, protoplasts mamillate when young, 8-spored; ascospores distichous, long-ellipsoid to subfusiform, unicellular, hyaline, about 12 $\times$ 4–5 μ.

Our specimens differ in several respects from the description of H. des Abbayes; the dimensions of the thallus and isidia are greater, the exciple is more scrobiculate, and the ascospores narrower. In some respects it is intermediate between this species and *Parmelia tinctorum* Despr. from the Canaries.

Sierra Leone: Sefadu (Gbense), on trunk of *Elaeis guineensis*, P. Adames, comm. F. C. Deighton M4753.

PARMELIA **subciliaris** Dodge, comb. nov.

Parmelia nilgherrensis Nyl. v. *subciliaris* Vainio, Hedwigia 37:(40). 1898.

Type: Uganda, Ruwenzori, 0° 5′ S., 2900–3200 m., G. F. Scott-Elliott 218.

Thallus foliose, about 4 cm. in diameter, pale olive buff, lobes about 1 cm. broad, margin crenulate, upper surface K yellow, smooth to slightly impressed, rugulose, minutely rimose-areolate in the older portions, cilia about 2 mm. long, simple or once dichotomous, black, margins of some lobes capitate-sorediose, soralia about 1 mm. in diameter, rarely subconfluent; under-surface rugulose, black, somewhat lighter at the margin; upper cortex 40 μ thick, a palisade of protopseudoparenchyma, cells about 6 μ in diameter; algal layer 25 μ thick, cells protococcoid, 7 μ in diameter; medulla 140 μ thick, of interwoven, thick-walled, mostly periclinal hyphae 6–7 μ in diameter, K—, C pink, KC—; lower cortex about 40 μ thick, black, pseudoparenchymatous, cells 4 μ in diameter, rhizinae about 60 μ in diameter, 3–5 mm. long, relatively few and confined to the middle of the thallus, twice or thrice dichotomously branched. Sterile.

Uganda: Ruwenzori, Western Province, Toro District, ridge forest on Nyinabitaba, 2500 m., on roots of *Tridactyla bicaudata* (Lindl.) Schltr., H. A. Omastin 1184.

PARMELIA SOYAUXII Müll. Arg., Linnaea 63:32. 1880.

Type: Angola, Pungo Andongo, Soyaux.

Thallus very large (two pieces available for study, 10 × 7 cm., and 11 × 7 cm.), 130–150 μ thick, pale olive buff to olive buff, K yellow, lobes crenate and crisped, up to 2 cm. broad, suberect, surface smooth, rimulose in the older portions, white-reticulate; under-side black, minutely rugulose; rhizinae very few, simple or with branched tips forming a holdfast; upper cortex 15 μ thick, of thin-walled pseudoparenchyma about 2 cells thick, heavily incrusted with minute yellowish crystals; algal layer about 30 μ thick, continuous, cells protococcoid, 5–6 μ in diameter; medulla 80 μ thick, of loosely woven, mostly periclinal very thick-walled hyphae 3 μ in diameter, more densely woven next the lower cortex, K—, C blood-red, KC—; lower cortex 12–15 μ thick, of septate, brown, conglutinate hyphae about 6 μ in diameter, cracking away and leaving the lower closely woven hyaline hyphae of the medulla to form a new pale buff cortex. Apothecia perforate, up to 3.5 cm. in diameter, exciple smooth like the thallus, margin crenate, stalk 4 mm. in diameter, 1 cm. tall, disc deeply concave at first, becoming nearly plane in very old apothecia; amphithecium extending about 500 μ beyond the thecium, inrolled when dry, 180–200 μ thick near the margin, of the same structure as the thallus but the medullary hyphae more densely interwoven and less periclinal throughout, algal layer under the hypothecium similar to that under the cortex which is almost completely gelified with very few minute yellow crystals; hypothecium 30 μ thick, almost completely gelified but showing traces of periclinal hyphae; thecium 65 μ tall; paraphyses conglutinate; dichotomous above, tips not thickened in the very pale brownish epithecial gel; asci broadly clavate, very thick-walled at first, tips remaining thick until the spores are mature, 8-spored, 35–45 × 14–18 μ; ascospores ellipsoid, unilocular, hyaline, 11–12 × 6–7 μ. Spermogonia oblate-spheroid, up to 130 μ in diameter, 105 μ tall, immersed in the medulla, neck about 15 μ long, 25 μ in diameter, wall wholly carbonaceous at maturity, pseudoparenchymatous; spermatiophores simple or dichotomous near the base, about 20 × 1 μ; spermatia cylindric, straight, 16–18 × 1 μ.

After the thecium disintegrates, the hypothecium functions as a cortex, leaving a slightly rugulose surface concolorous with the thallus, but not white-reticulate. Müller Argau evidently had only young apothecia ("parvula"), as young apothecia only 2–4 mm. in diameter are also present in our material. In habit, our plants suggest *Parmelia latissima* Fée, but internal structure is quite different.

Sierra Leone: Picket Hill (Colony), 740 m., T. S. Jones, comm. F. C. Deighton M4592.

USNEACEAE

Thallus fruticose, erect, prostrate or pendent, attached to the substrate by a hapteron, corticate with longitudinal, conglutinate hyphae in *Alectoria*, *Oropogon* and two species of *Ramalina*, otherwise fastigiate, of compact, subvertical hyphae, only somewhat pseudoparenchymatous; algae protococcoid (*Trentepohlia* in *Usnea*

sect. *Roccellinae*); medulla compact to arachnoid, often with a chondroid axis or strands of thick-walled, conglutinate, parallel hyphae, variously disposed. Apothecia circular, sessile or stipitate; amphithecium well developed; asci 1–8-spored; ascospores hyaline or brown, unicellular to muriform, relatively thick-walled.

1. Ascospores unicellular 2
1. Ascospores bilocular; cortex fastigiate 10
1. Ascospores muriform, large; asci monosporous ..... *Oropogon* Th. Fr.
   2. Medulla with a variable number of strands of mechaincal tissue ..... *Lethariа* Zahlbr.
   2. Medulla uniform, either arachnoid or compact and horny 3
3. Cortex of conglutinate, periclinal hyphae ..... *Alectoria* Ach.
3. Cortex fastigiate, of subvertical hyphae 4
   4. Medulla of loosely tangled hyphae 5
   4. Medulla of periclinal hyphae 7
5. Thallus hollow 6
5. Thallus not hollow, dorsi-ventrally flattened ..... *Evernia* Ach.
   6. Thallus more or less inflated, thin ..... *Dactylina* Nyl.
   6. Thallus podetiiform, short, thick ..... *Endocoena* Crombie
7. Medulla of loosely woven hyphae; apothecia unknown ..... *Thamnolia* Ach.
7. Medulla either horny, cartilaginous, or inner portion differentiated as a chondroid axis 8
   8. Thallus podetiiform, relatively short, often coralloid; apothecia unknown ..... *Siphula* Fr.
   8. Thallus fruticose, usually much longer 9
9. Thallus flattened, whole medulla compact, algal layer lacking below ..... *Everniopsis* Nyi.
9. Thallus cylindric or angled, medulla loose surrounding the chondroid axis ..... *Usnea* [Hill] Wigg.
   10. Specialized mechanical tissue not developed; spermogonia black ..... *Desmaziera* Mont.
   10. Specialized mechanical tissue highly developed, thallus usually flattened; spermogonia pale ..... *Ramalina* Ach.

USNEA

Usnea Hill, Gen. Nat. Hist. 2:85. 1751; Wigg., Primit. Fl. Holsat. 90. 1780.

Type: *Lichen floridus* L.

Thallus fruticose or filamentous, usually of several compound branches, dichotomous, rarely sympodially branched, or unbranched, 1 cm. –7 m. long, erect, prostrate or pendent, attached to the substrate by a hapteron; branches thick at the base, thinning uniformly or abruptly toward the apex, 0.2–7 mm. thick, terete, angled or longitudinally sulcate or foveolate, smooth, verrucose, papillate, tuberculate or spinuliferous, continuous, areolate or annulate; soredia farinose or isidioid; cortex thin and fragile, or thick and cartilaginous, of densely woven, thick-walled, conglutinate, vertical hyphae, evanescent on the primary branches in a few species; algae usually protococcoid (*Trentepohlia* in the *Roccellinae*); medulla of loosely or compactly woven longitudinal hyphae; chondroid axis single, of thick-walled conglutinate, longitudinal hyphae, usually solid, rarely lacerate on the surface (hollow with a few arachnoid hyphae in the subg. *Eumitria*). Apothecia lecanorine, cup-shaped, plane or somewhat irregular, lateral (appearing terminal when formed near the tip of a branch, bent sharply and partly fused with the apothecium, the tip then resembling a long cilium), margin thin, smooth or scrobiculate, nude or ciliate; paraphyses conglutinate, septate, somewhat branched; asci subcylindric, 8-spored; ascospores unilocular, ellipsoid, hyaline. Spermogonia rare, immersed in the cortex, wall pale or slightly darkened; spermatiophores sparingly septate; spermatia straight, one end often slightly thicker.

Of the six subgenera, only *Eumitria* and *Euusnea* occur in our area. In preparing the following key, I have followed Motyka, Lich. Gen. Usnea Stud. Monogr. 1–651. 1936–1938, giving his geographic distributions for the various species.

1. Algae *Trentepohlia,* thallus grayish green, rigid, 5–10 cm. tall....2
1. Algae protococcoid 3
   2. Thallus with soredia and abundant spinules, axis with some blackened hyphae; apothecia abundant, 3–5 mm. in diameter; Tanganyika....*U. perhispidella* Steiner
   2. Thallus without soredia or spinules, axis with a narrow central cavity; apothecia rare, up to 10 mm. in diameter; Tanganyika....*U. Liechtensteinii* Steiner
3. Chondroid axis hollow in the thicker branches, partly filled with a few loosely woven hyphae; apothecia usually ciliate, rarely eciliate; thallus smooth or papillate, not scrobiculate nor tuberculate; soredia isidiose; subg. EUMITRIA....4
3. Chondroid axis solid, rarely somewhat lacerate, never with a distinct cavity; subg. EUUSNEA....9
   4. Thallus distinctly angular (at least papillae in rows), smooth between the papillae; medulla white, rather thick and lax; Mozambique....*U. cristata* Mot.
   4. Thallus terete, not angled nor papillae in rows....5
5. Thallus almost eramulose, with a few irregular ramuli, persistently ashy green, branches perpendicular, straight or irregularly flexuous, 2 mm. in diameter, tapering gradually to the apices; sterile 6
5. Thallus typically ramulose, branches divergent, farinose 7
   6. Cavity of axis narrow; thallus olive green; Angola....*U. Welwitschiana* Mot.
   6. Cavity of axis broad; thallus glaucous; Tanganyika....*U. elata* Mot.
7. Thallus fertile, not sorediose; branches somewhat inflated; apothecia 0.7–1 cm. in diameter, disc pruinose; Uganda ....*U. firmula* Mot.
7. Thallus sterile, sorediose, ashy green, often pruinose....8
   8. Thallus 2 mm. in diameter, ramulose throughout; Tanganyika....*U. Baileyi* (Stirton) Mot.
   8. Thallus 1–1.2 mm. in diameter, ramulose below, nude above; St. Helena, Angola to Cameroons ....*U. implicita* (Stirton) Mot.
9. Thallus foveolate or scrobiculate, not terete, epapillate, flaccid, base not blackened; FOVEATAE 10
9. Thallus terete or acutely angled, usually more rigid....15
   10. Thallus 15–20 cm. long, not fruticulose, very flaccid 11
   10. Thallus 3–9 cm. tall, fruticulose 12
11. Thallus sorediose; Tanganyika ....*U. terrestris* Mot.
11. Thallus not sorediose, partly somewhat fuscous, not contorted; Cameroons....*U. versicolor* Mot.
   12. Thallus distinctly flattened, 3 cm. tall; fertile; not sorediose; Abyssinia.... ....*U. complanata* (Müll. Arg.) Mot.
   12. Thallus never flattened, sorediose 13
13. Thallus 9 cm. tall, distinctly acutely wrinkled; Abyssinia to Kenya....*U. corrugata* Mot.
13. Thallus 6–7 cm. tall, not acutely wrinkled 14
   14. Branches closely ramulose; soredia in farinose tubercules; Abyssinia to the Cormoro Archipelago ....*U. pulverulenta* (Müll. Arg.) Mot.
   14. Branches sparingly and irregularly ramulose; soredia isidiose on ridges; cortex of larger branches not areolate; French Guinea southward....*U. leprosa* Mot.
15. Thallus articulate with pseudocyphellae, not papillate, 25–40 cm. long; medulla very lax; ARTICULATAE 16
15. Thallus continuous, or articulate without pseudocyphellae, often fruticulose, papillate or ramulose 21
   16. Thallus 25 cm. long, regularly ramulose; Tanganyika....*U. flavescens* Mot.
   16. Thallus eramulose or with an occasional ramulus, 25–40 cm. long....17
17. Pseudocyphellae elevated, farinose; thallus 25 cm. long, 2 mm. in diameter; Nigeria and Cameroons ....*U. pseudocyphellata* Mot.
17. Pseudocyphellae small, not elevated 18
   18. Thallus 30 cm. long, quite rigid, joints up to 7 cm. long, more or less curved; São Thomé ....*U. speciosa* Mot.
   18. Thallus flaccid, joints 1–3 cm. long, straight....19
19. Thallus smooth, more than 20 cm. long, pale green; Kenya and Tanganyika....*U. vesiculata* Mot.
19. Thallus distinctly rugose, 40 cm. long....20
   20. Thallus foveolate, stramineous or pale green, not changing color in the herbarium; sterile; Eritrea and Somaliland ....*U. praelonga* Stirton
   20. Thallus not foveolate, becoming lurid fuscous in the herbarium; apothecia 5 mm. in diameter; Abyssinia ....*U. rugosa* Mot.

21. Thallus never ashy green, either persistently stramineous, yellow, or becoming fuscous in the herbarium; living plants with a thin papery cortex, or if thicker, very smooth.....22
21. Thallus ashy green, rarely red, or if stramineous, papillate or tuberculate, seldom becoming brown in the herbarium 39
22. Thallus long, pendent, subarticulate or moniliform; STRAMINEAE.....23
22. Thallus short, fruticulose; GLABRATAE 30
23. Thallus pale stramineous or pale yellow, not changing color in the herbarium, subarticulate with almost no ramuli; AMOENAE 24
23. Thallus stramineous, fuscescent in the herbarium, ramulose; EUSTRAMINEAE; saxicole; Abyssinia .....*U. saxatilis* Mot.
23. Thallus stramineous, soon fuscescent in the herbarium, sulcate and angled, typically with abundant ramuli; SULCATAE 26
24. Thallus 0.6 mm. in diameter, very flaccid, medulla K reddening; Uganda and Kenya .....*U. Vainioana* Zahlbr.
24. Thallus 1–2 mm. in diameter, rigid 25
25. Ramuli abundant, branches 2 mm. thick below, very slender above; Kenya..... .....*U. exasperata* (Müll. Arg.) Mot.
25. Ramuli confined to upper portion of branches in small clusters; St. Helena.....*U. pulchella* Mot.
25. Ramuli absent or very rare, not in clusters; thallus moniliform; medulla rather dense; Kenya southward .....*U. moniliformis* Mot.
26. Thallus less deeply and distinctly sulcate 27
26. Thallus very deeply longitudinally sulcate 28
27. Thallus 0.5 mm. in diameter, somewhat compressed; East Africa... .....*U. gracilis* Ach.
27. Thallus 1.5 mm. in diameter; Kenya southward.....*U. fusca* Mot.
28. Branches 2 mm. or more in diameter, acutely angled, becoming quite slender and less angled toward the tips; Uganda .....*U. decipiens* Mot.
28. Branches about 1 mm. in diameter, less acutely angled, ramuli few and irregularly arranged; apothecia 1 cm. in diameter 29
29. Thallus 13 cm. long, ramuli very few and slender, up to 10 mm. long; exciple foveolate; Uganda .....*U. flaccida* (Müll. Arg.) Mot.
29. Thallus 40 cm. long, ramuli coarse, 5 mm. long; exciple smooth; Uganda....*U. aequatoriana* Mot.
30. Thallus subarticulate, sparingly ramulose; medulla lax; sterile; PYCNOCLADAE.....31
30. Thallus subarticulate or continuous, with abundant ramuli; medulla lax; fertile; CILIIFERAE 35
30. Thallus continuous, ramuli or spinules very crowded; medulla lax; fertile or sorediose; SCÅBRIDAE 38
30. Thallus smooth, green when fresh, very dark fuscous in the herbarium; medulla thin, compact; OSSEOLUCAE; thallus 8.5 cm. tall, 3 mm. in diameter, fruticose, rigid, sorediose; Tanganyika .....*U. incrassata* (Müll. Arg.) Mot.
31. Thallus 12–15 cm. long, pendent, flaccid, irregularly branched and ramulose; soredia in punctiform soralia 32
31. Thallus 4–10 cm. tall, flaccid, more or less regularly branched.....33
32. Thallus very indistinctly papillate; Tanganyika.....*U. hispidula* (Müll. Arg.) Zahlbr.
32. Thallus with distinct wrinkles but nearly terete, distinctly ramulose; Tanganyika southward .....*U. usambarensis* Mot.
33. Medulla K red, ramuli quite stiff, not crowded; thallus 7–10 cm. tall; Kenya southward .....*U. cartilaginea* Laur.
33. Medulla K— 34
34. Thallus 10 cm. tall; soralia in distinct tubercules; Kenya and Uganda.....*U. Haumanii* Mot.
34. Thallus 4 cm. tall, soralia in indistinct, somewhat blackened tubercules; Abyssinia to Uganda and Congo .....*U. ruwenzoriana* Mot.
35. Ramuli sparse but regularly disposed; apothecia 5 mm. in diameter; São Thomé southward .....*U. ochrophora* (Stzbgr.) Mot.
35. Ramuli close to crowded 36
36. Thallus sparingly branched, branches cylindric or indistinctly inflated; apothecia 5 mm. in diameter; Uganda .....*U. simplicissima* Mot.
36. Branches distinctly inflated, repeatedly branched 37
37. Thallus 3–5 cm. tall, becoming olivaceous in the herbarium; apothecia small; Cameroons .....*U. submollis* Steiner
37. Thallus 7–15 cm. tall, grayish green becoming deep fuscous in the herbarium; apothecia 15 mm. in diameter, cilia flaccid; Uganda and Tanganyika.....*U. ruvidescens* (Jatta) Mot.
38. Thallus 9 cm. tall, fruticose, sorediose; spinules not very dense; soredia isidiose, over most of the branches; medulla K yellow then promptly deep red; Angola to Tanganyika southward .....*U. undulata* Stirton
38. Thallus 5 cm. tall, not sorediose; spinules dense; medulla K yellow then slowly and indistinctly red; apothecia 2–3 mm. in diameter; Congo to Rhodesia.....*U. perspinosa* Mot.

39. Thallus thick, medulla thick and loosely woven, irregularly branched, apices short and thick, not filiform, smooth or coarsely tuberculate; DENDRITICAE 40
39. Thallus slender, medulla thin, compact 48
40. Thallus without pseudocyphellae, ramuli sparse; fertile; CLADOCARPAE....41
40. Thallus with pseudocyphellae, abundantly ramulose, usually fertile; ALBOMACULATAE....44
40. Thallus with pseudocyphellae, almost eramulose, articulate, rugose with farinose spots; SERPENTARIAE 46
41. Thallus 20 cm. long, pendent, at least 1 mm. thick, usually thicker, tips rather short and thick, sparsely ramulose, papillae rather large; medulla somewhat K reddening; apothecia 8 mm. in diameter; Tanganyika ....*U. trachyna* Mot.
41. Thallus less than 15 cm. tall, usually much shorter, rigid, fertile not sorediose....42
42. Thallus 5 cm. tall, dirty pale olive green; apothecia 15 mm. in diameter, exciple papillate; West Africa ....*U. scutata* Mot.
42. Thallus 7–15 cm. tall; apothecia up to 10 mm. in diameter; thallus ashy fuscescent in the herbarium, densely ramulose and papillate 43
43. Thallus 15 cm. tall, medulla 600 μ thick, loosely woven; apothecia cupuliform, exciple smooth; ramuli inflated; Nigeria to Angola....*U. hispida* Mot.
43. Thallus 7 cm. tall, medulla 400 μ thick; apothecia plane or deformed, exciple scrobiculate; ramuli thick, not inflated; Cameroons ....*U. Ledienii* Mot.
44. Thallus pale fuscous, white spotted; cortex firm, caespitose, branches subparallel; Abyssinia ....*U. albomaculata* Mot.
44. Thallus not white spotted 45
45. Thallus both fertile and sorediose; Abyssinia....*U. abissinica* Mot.
45. Thallus fertile, not sorediose, smooth, glabrous; cortex firm; Abyssinia to Uganda.... ....*U. obtusata* Mot.
46, Thallus olive green, medulla 900 μ thick; Cameroons southward....*U. Bornemuelleri* Steiner
46. Thallus sepia to fuscous or almost black in the herbarium, branches articulate and papillate; medulla 600 μ; Abyssinia 47
47. Branches 2–3 (–5) mm. in diameter, soredia isidiose in ridges....*U. Flotowii* Zahlbr.
47. Branches 2 mm. in diameter; apothecia rare, 10 mm. in diameter, exciple smooth.... ....*U. Flotowii* subsp. *serpentaria* Mot.
48. Medulla very thin, white, never rose; thallus fruticulose, sparingly branched, 3.5–12 (–20) cm. tall, densely ramulose; SETULOSAE 49
48. Medulla thicker, rose-color or if white then thallus over 25 cm. long, pendent; ELONGATAE 55
49. Thallus grayish green, 3.5–10 cm. tall; DENSIROSTRAE 50
49. Thallus with red or red-variegated cortex, 4–12 cm. tall; RUBIGINEAE 52
50. Thallus 5 cm. tall, very densely ramulose throughout, divergently branched; apothecia 5 mm. in diameter; Congo ....*U. torrida* Mot.
50. Thallus irregularly ramulose, partly papillate or verrucose....51
51. Thallus 3.5 cm. tall, ramuli and tips coralloid branched; sterile; Tanganyika.... ....*U. myrioclada* (Steiner) Mot.
51. Thallus 8–10 cm. tall, ramuli unbranched; apothecia 2 cm. in diameter; Tanganyika southward ....*U. picta* (Steiner) Mot.
52. Thallus 20 cm. long, pendent, flaccid, subarticulate, not densely ramulose; medulla K yellow then red; Kenya and Uganda....*U. erubescens* (Stein) Mot.
52. Thallus fruticulose, 4–12 cm. tall, rigid, densely ramulose, medulla K—....53
53. Thallus 4 cm. tall, apothecia small; Tanganyika southward....*U. subflorida* (Zahlbr.) Mot.
53. Thallus 4–12 cm. tall, sorediose 54
54. Soralia broad, eroded; thallus 12 cm. tall; Congo....*U. bicolorata* Mot.
54. Soralia small; thallus 4–6 cm. tall, densely branched, tips blackening, red color less conspicuous than in other species of the section; Kenya to Uganda.... ....*U. Meyeri* (Stein) Mot.
55. Thallus relatively thick, more or less deformed but not angular or exactly terete, pale green, frequently branched; CERATINAE 56
55. Thallus thick, angular in cross-section, infrequently branched, green; GONIODES....59
55. Thallus slender, terete, infrequently branched, grayish green; LONGISSIMAE....61
56. Medulla rose; thallus 6 cm. tall, rather densely ramulose, pale green, axis 360 μ thick, somewhat lacerate in the middle; Congo southward....*U. acanthera* Vainio
56. Medulla white; thallus over 25 cm. long, pendent, sparsely and irregularly papillate....57
57. Medulla K at least slowly reddening or fuscescent; papillae irregularly arranged, adult branches about 2 mm. in diameter, cortex areolate-scrobiculate; Congo southward ....*U. distensa* Stirton
57. Medulla K— 58

58. Thallus 60 cm. long, axis 500 μ in diameter; ramuli close, larger, dichotomous; apothecia 10–20(–30) mm. in diameter; Angola to Tanganyika.....*U. amplissima* Stirton
58. Thallus 25 cm. long, axis 250 μ in diameter with some fuscous hyphae; ramuli distant, short, tips farinose-verrucose; sterile; St. Helena.....*U. umbrata* Mot.
59. Thallus 4 mm. in diameter, very hard; Congo .....*U. gigas* Mot.
59. Thallus rarely over 2 mm. in diameter, quite soft.....60
60. Thallus 50 cm. long, almost without ramuli, folds at angles elevated; Uganda..... .....*U. chloreoides* (Vainio) Mot.
60. Thallus more than 100 cm. long, regularly ramulose, very long, quite soft; Nigeria southward .....*U. africana* Mot.
61. Cortex well developed even on the primary branches, continuous or areolate.....62
61. Cortex of larger branches evanescent or shredded, mostly ecorticate.....64
62. Branches 0.9 mm. in diameter, ramuli sparse and irregular, 1–3 cm. long; St. Helena .....*U. Lyngei* Mot.
62. Branches up to 0.8 mm. in diameter or partly thicker and fasciate-flattened.....63
63. Thallus partly fasciate-flattened, axis solid; Cameroons.....*U. livida* Mot.
63. Thallus terete or slightly angular, deformed in larger branches; axis solid or with yellow hyphae; regularly ramulose, quite rigid; Kenya.....*U. contorta* Jatta
64. Thallus pale green, 1 mm. in diameter, ramuli 1–2(–3) cm. long, rare; Congo..... .....*U. arguta* Mot.
64. Thallus pale stramineous to ashy green, wholly ecorticate, 0.4–0.6 mm. in diameter, ramuli 0.5–1.5 cm. long, abundant; Congo to Tanganyika.....*U. trichodeodes* Vainio

USNEA LEPROSA Motyka, Lich. Gen. Usnea Stud. Monogr. 106. 1936.

Type: South Africa, Lydenburg, arboricole, Willms.

Thallus 7 cm. long, subpendent, closely divergently branched, closely ramulose below, almost without ramuli above, very flaccid, soredia pale ashy green; base attenuate, expanding rapidly and repeatedly branching, 1.3 mm. in diameter, usually distinctly articulate, more or less terete but partly foveolate, smooth, farinose from confluent soredia, ramuli close, filiform, 0.5–5 mm. long, straight, the thicker again ramulose and sorediose. Apices quite long, sparingly branched, eramulose, flexuous and sorediose; cortex 100 μ thick, soft; medulla 500 μ thick, loosely woven, white, K—; axis 250 μ in diameter. Apothecia 5 mm. in diameter, exciple smooth or with spinules; cilia few, short, thick, obtuse, sorediose; disc plane or convolute, densely farinose. Soredia isidiose on minute ridges, variable in size.

The above is based on Motyka's description, as our material is only a fragment, about 3 cm. long, with 5 apothecia and part of the cortex torn away in collecting. Such characters as are observable agree with the above description.

Sierra Leone: Sugar Loaf Mt., 600 m., on rocks in forest of upper slopes, F. C. Deighton 4441.

USNEA HISPIDA Motyka, Lich. Gen. Usnea Stud. Monogr. 589. 1938.

Usnea barbata v. *florida* f. *australis* Vainio, Cat. Welwitsch Afric. Pl. 2:396. 1901.

Type: Cameroons, Huea, arboricole, Lemperch.

Thallus about 15 cm. tall, rigid, becoming dark ashy fuscous in the herbarium, the smaller branches somewhat paler, opaque, base short, rigid, closely annulate, repeatedly sympodially branched at right angles; branches straight or slightly curved, articulate, joints inflated up to 3 mm. in diameter, papillae quite dense, irregular, conic, acute, the larger joints partly paler and rarely almost epapillate; cortex 100 μ thick, hard, slightly fuscous; medulla about 600 μ thick, loosely

woven, white, K—; axis 500 μ in diameter; ramuli close, perpendicular, 2–10 mm. long, attenuate at the base, thicker in the middle, apices smooth, the larger tuberculate and bearing apothecia. Apothecia numerous, rarely beyond 10 mm. in diameter, cupuliform; exciple smooth or with some large tubercles on the larger apothecia; cilia few, usually 4–8 per apothecium, broad at the base, conic-attenuate above, smooth; disc concave to plane, chalky white-pruinose; ascospores hyaline, unilocular, 11 $\times$ 6 μ.

Sierra Leone: Sugar Loaf Mt., 650–775 m., F. C. Deighton M4440.

Cameroons: [Victoria], Mrs. G. Thomson.

Blasteniaceae

Thallus crustose, indeterminate or effigurate, attached to the substrate by hyphae of the prothallus or of the medulla, heteromerous, rarely homoeomerous; ecorticate or with a fastigiate cortex which rarely appears pseudoparenchymatous; algae protococcoid; sometimes corticate below in *Gasparrinia* and *Kuttlingeria*. Apothecia round, sessile or immersed, biatorine, lecideine or lecanorine, usually with an algal layer under the hypothecium; epithecium granular or powdery, usually containing chrysophanic acid (producing a purple or violet color with potassium hydroxide); paraphyses simple, septate, tips usually characteristically thickened; asci normally 8-spored, fewer in some species of *Bombyliospora;* ascospores hyaline, thick-walled, usually polari-2–4-locular (unilocular in *Protoblastenia* and *Fulgensia,* plurilocular with rounded protoplasts in *Bombyliospora*).

There is no agreement among lichenologists on the number of genera to be recognized in this difficult family. *Bombyliospora* is so distinct that it is generally recognized as a genus, although some might not include it in this family but leave it in the *Lecideaceae*. Some would recognize only *Caloplaca* or one of its synonyms for the other genera, while I am inclined to recognize all of the genera in the following key. Since many species have been described in one genus and transferred elsewhere, depending on the number of genera recognized by an author, I have prepared keys to all the species described from tropical Africa and sorted them into the genera which I recognize, but without making new combinations in order not to add to the synonymy. The whole family is badly in need of revision, especially the temperate species.

1. Apothecia biatorine, but algae may occur beneath the hypothecium 2
1. Apothecia lecideine; thallus crustose, indeterminate; ascospores polari-bilocular ..... *Huea* Dodge & Baker
1. Apothecia lecanorine 4
   2. Ascospores unilocular ..... *Protoblastenia* Steiner
   2. Ascospores polari-bilocular 3
   2. Ascospores 3–4-locular ..... *Xanthocarpia*
   2. Ascospores plurilocular, large, protoplasts lenticular or rounded ..... *Bombyliospora* DNtrs.
3. Thallus crustose, indeterminate, usually ecorticate ..... *Blastenia* Mass.
3. Thallus effigurate, usually corticate ..... *Kuttlingeria* Trev.

4. Ascospores unilocular, thallus effigurate.....*Fulgensia* Mass. & DNtrs.
4. Ascospores polari-bilocular 5
4. Ascospores 3(–4)-locular; thallus indeterminate .....*Triophthalmidium* Müll. Arg.
5. Thallus indeterminate, usually ecorticate .....*Pyrenodesmia* Mass.
5. Thallus effigurate, usually corticate both above and below.....*Gasparrinia* Tornab.

BOMBYLIOSPORA

BOMBYLIOSPORA DNtrs. in Mass., Ricerche Autonom. Lich. Crost. 114. 1852.

Psorothecium sect. *Bombyliospora* Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges. 160. 1862.

Lecania sect. *Platylecania* Müll. Arg., Flora 65:327. 1882.

Type: *Lecidea tuberculosa* Fée.

Thallus epiphloeodal, indeterminate; cortex decomposed, of periclinal hyphae; algae *Trebouxia* or protococcoid; medulla of periclinal hyphae, rather compact. Apothecia sessile, constricted at the base, large, margin persistent; amphithecium absent; parathecium light-colored, not carbonaceous, pseudoparenchymatous from radiating thick-walled hyphae; hypothecium hyaline or darkened, of periclinal, slender hyphae; paraphyses slender with clavate to pyriform tips; asci 1–8-spored; ascospores large, hyaline, ellipsoid to oblong, septate with rounded or lenticular protoplasts.

1. Ascospores under 46 μ long 2
1. Ascospores over 75 μ long 5
2. Ascospores 4-locular, 30–46 × 14–22 μ; asci 4-spored; apothecia rather dark-colored; São Thomé .....*B. thomensis* (Nyl.) Zahlbr.
2. Ascospores 6–8-locular 3
3. Ascospores 28–30 × 11–12 μ; asci 8-spored 4
3. Ascospores 20–30 × 9–13 μ; Tanganyika.....*B. dominguensis* v. *intermedia* (Müll. Arg.) Zahlbr.
4. Hypothecium hyaline, thecium 65 μ tall; disc dark fuscous, margin orange; thallus up to 80 μ thick; Nigeria.....*B. nigeriensis* Dodge
4. Hypothecium yellowish; thecium 90–95 μ tall; disc orange or tawny, margin paler; thallus 100 μ thick; Tanganyika .....*B. cerinella* Zahlbr.
5. Hypothecium pale 6
5. Hypothecium dark 7
6. Thallus cervine ashy, isidio-tartareous; disc very dark brown; ascospores solitary, 80 × 20 μ; Tanganyika .....*B. Meyeri* Stein
6. Thallus grayish olive, rugulose verrucose; disc orange, margin white; asci 3–4-spored; ascospores 67–70 × 12–14 μ; Nigeria.....*B. Thoroldi* Dodge
7. Thallus pale glaucous, tuberculate; hypothecium vinous above "on undulated staffs, tipped a deep-blue colour"; ascospores probably solitary, about 80–110 × 20–30 μ; Nigeria .....*B. endoleucites* (Stirton) Zahlbr.
7. Thallus pale yellowish, rugulose granulose, farinose; disc pruinose then fuscous; hypothecium rufo-fulvous to rufo-fuscous; ascospores 90 × 23 μ; asci (2–)4-spored; Tanganyika .....*B. pruinata* (Müll. Arg.) Zahlbr.
7. Thallus olive green, rugulose and coarsely granulose; disc fuscous black; hypothecium fuscous; ascospores 75–90 × 25–33 μ; asci 3–4-spored; Gold Coast (Togoland)..... .....*B. togoensis* (Müll. Arg.) Zahlbr.

BOMBYLIOSPORA **nigeriensis** Dodge, sp. nov.

Type: Nigeria, Ondo Province, Ipetu, on *Theobroma*, C. A. Thorold 106.

Thallus epiphloeodes, rugulosus vel laevis, continuus, ad 80 μ crassitudine, obscure olivaceo-alutaceus; cortex 15 μ crassitudine, decompositus gelifactusque, hyphis periclinalibus; stratum algarum 20 μ crassitudine, cellulis *Trebouxiae*, 3–4 μ diametro; medulla ad 45 μ crassitudine, hyphis conglutinatis periclinalibus inter-

textis. Apothecia solitaria vel aggregata, rare 3–4 concrescentia, basi constricta, 0.7–1 mm. diametro, margine aurantiaco, integro, elevato dein disco aequante; disco brunneo; parathecium 120 μ crassitudine, strato extero 15 μ crassitudine minutis cum crystallis aurantiacis, aliter hyalinum, hyphis radiantibus, pachydermeis, conglutinatis, septatis, pseudoparenchyma formantibus; hypothecium hyalinum, 40 μ crassitudine, hyphis periclinalibus, 3–4 μ diametro, pachydermeis; thecium 65 μ altitudine; paraphyses tenues, pachydermeae, super ascos dichotome ramosae, apicibus clavatis cum crystallis brunneis tectis; asci ellipsoidei, 50–55 $\times$ 15 μ; ascosporae octonae, hyalinae, ellipsoideae vel subfusiformes, protoplastis lenticularibus, 8-loculares, 27–30 $\times$ 12 μ.

Thallus epiphloeodal, rugulose or smooth, continuous, up to 80 μ thick, deep olive buff; cortex about 15 μ thick, decomposed and gelified, of mostly periclinal hyphae; algal layer 20 μ thick, cells of *Trebouxia*, 3–4 μ in diameter, closely packed or more scattered; medulla up to 45 μ thick, of conglutinate, interwoven, mostly periclinal hyphae. Apothecia solitary or aggregated, rarely 3–4 concrescent, constricted at the base, 0.7–1 mm. in diameter, margin orange, entire, elevated at first, then level with the flat, amber-brown disc; parathecium 120 μ thick below and on the sides of the thecium, the outer 15 μ orange with abundant aggregates of minute crystals, the rest hyaline, of radiating, conglutinate, thick-walled, closely septate hyphae 4–8 μ in diameter, forming a pseudoparenchyma; hypothecium 40 μ thick, hyaline, of thick-walled, mostly periclinal hyphae 3–4 μ in diameter; thecium 65 μ tall; paraphyses slender, thick-walled, dichotomously branched above the asci, tips slightly clavate, obscured by masses of brownish crystals to a depth of 15 μ in the epithecial gel; asci ellipsoidal, 8-spored, 50–55 $\times$ 15 μ; ascospores hyaline, ellipsoid to subfusiform, protoplasts lenticular, 8-locular, 27–30 $\times$ 12 μ.

This species belongs in the group with *B. cerinella* Zahlbr. from which it differs in its thinner thallus, orange margin, fuscous to almost black disc, lower thecium, hyaline hypothecium, and more septate ascospores. *B. thomensis* (Nyl.) Zahlbr. from São Thomé differs in having asci about 4-spored, ascospores larger, 30–46 $\times$ 14–22 μ, only 4-locular.

Nigeria: Ondo Province, Ipetu, C. A. Thorold 106, type; Oyo Province, Iseyin, C. A. Thorold 107; Moor plantation near Ibadan, C. A. Thorold 105; all on *Theobroma.*

BOMBYLIOSPORA **Thoroldi** Dodge, sp. nov.

Type: Nigeria, Oyo Province, Iseyin, on *Theobroma*, C. A. Thorold 108.

Thallus epiphloeodes, rugulosus, verrucosus, continuus, 40 μ crassitudine, griseo-olivaceus; cortex 15 μ crassitudine, hyphis tenuibus periclinalibus conglutinatis; stratum algarum 12–15 μ crassitudine, cellulis *Trebouxiae*, 3–4 μ diametro, dense dispositis; medulla 10–13 μ crassitudine, hyphis tenuibus dense contexta. Apothecia 0.5–0.8 mm. diametro, basi constricta, margine tenui, albo, disco plano, cinnamomeo-alutaceo; parathecium hyalinum, 60–85 μ crassitudine sub hypothecio,

ad 40 μ superne tenuescens, hyphis radiantibus, pachydermeis, 4 μ diametro, pseudoparenchyma formantibus, hypothecium hyalinum vel pallide flavum, 12 μ crassitudine, hyphis tenuibus periclinalibus contextum; thecium 105 μ altitudine; paraphyses pachydermeae, conglutinatae, apicibus clavatis vel pyriformibus; asci leptodermei, apicibus non incrassatis; ascosporae ternae quaternaeve, 10-loculares, cellulis intermediis longioribus, protoplastis subcylindricis, 67–70 $\times$ 12–14 μ.

Thallus epiphloeodal, rugulose, verrucose, continuous, 40 μ thick, grayish olive; cortex 15 μ thick, cells of *Trebouxia*, 3–4 μ in diameter, closely packed but sometimes interrupted by strands of medulla; medulla 10–13 μ thick, of slender, closely interwoven hyphae. Apothecia 0.5–0.8 mm. in diameter, constricted at the base, margin thin, white, disc plane, cinnamon buff, both watery white when moist; parathecium hyaline, 60–85 μ thick below the hypothecium, thinning to 40 μ thick above, of radiating, thick-walled hyphae about 4 μ in diameter, forming a pseudoparenchyma; hypothecium hyaline or pale yellowish, 12 μ thick, of slender, mostly periclinal, interwoven hyphae; thecium 105 μ tall; paraphyses thick-walled, conglutinate, tips clavate to pyriform, ending in the pale yellowish epithecial gel; asci 3–4-spored, thin-walled, tips not thickened; ascospores hyaline, 10-locular, middle cells longer, protoplasts cylindric with corners rounded, septa and wall thick, 67–70 $\times$ 12–14 μ.

BLASTENIA

Blastenia Mass., Atti I. R. Ist. Veneto II, 3:append:101. 1852; Flora 35:575. 1852.

Type: *B. sinapisperma* (Lam.) Mass. For discussion, see Dodge & Baker, Ann. Mo. Bot. Gard. 25:611. 1938.

Thallus crustose, indeterminate, powdery, granulose or rimose, attached to the substrate by the hyphae of the prothallus or of the medulla, homoeomerous or heteromerous; ecorticate or with slightly developed cortex; algae protococcoid. Apothecia round, immersed to sessile; parathecium well developed; amphithecium absent, epithecium granular or powdery, K violet or purple; hypothecium hyaline; paraphyses simple, septate, capitate; asci 4–16-spored; ascospores hyaline, ellipsoid, polari-bilocular. Spermogonia immersed, spherical; spermatiophores septate; spermatia short, cylindric, straight.

In the following key the species with black apothecia probably belong in *Huea*, but in the absence of material, I have not wished to make the transfer. *Blastenia Brebissonii* v. *microspora* evidently belongs in *Xanthocarpia*.

1. Ascospores 3-locular, 20–24 $\times$ 12–13 μ; Angola.....*B. Brebissonii* v. *microspora* (Vainio) Zahlbr.
1. Ascospores 2-locular 2
   2. Thallus vitelline, granulose; apothecia orange, 0.5–0.8 mm.; ascospores 11–14 $\times$ 7–8 μ; Ilha Principe .....*B. pertenuescens* (Nyl.) Zahlbr.
   2. Thallus pale ochre; apothecia orange, 0.3–0.6 mm.; ascospores 12–14 $\times$ 6.5–8 μ; Mauretania .....*B. mauretaniae* (Hue) Zahlbr.
   2. Thallus olive black, granulose; apothecia black when dry, 0.2–0.3 mm.; ascospores 11–14 $\times$ 5–8 μ; Abyssinia.....*B. maurula* Müll. Arg.
   2. Thallus white 3

3. Disc ferruginous-fuscous or dark rufous, blackening; saxicole.....4
3. Disc flesh-yellow; apothecia 0.5 mm.; ascospores 8–11 × 4–7 μ; Ilha Principe.....*B. albidopallens* (Nyl.) Zahlbr.
3. Disc orange-red; apothecia 0.5–1.2 mm.; ascospores 15–22 × 8–12 μ; Kenya.....*B. laetebunda* (Hue) Zahlbr.
3. Disc orange tawny; apothecia 0.2–0.4 mm.; ascospores 14–16 × 6–8 μ; Mauretania.....*B. sordida* (Hue) Zahlbr.
4. Thallus granulose; apothecia 1 mm.; ascospores 14–16 × 7–8 μ; Cormoro Archipelago.....*B. cormorensis* Lindau
4. Thallus rimulose areolate.....5
5. Apothecia fuscous black, plane then convex to subspherical, pedicellate; St. Helena.....*B. lactescens* (Leight.) Zahlbr.
5. Apothecia fuscous, plane, margin black; apothecia 0.5–0.8 mm.; ascospores 15–19 × 4–6 μ; Ilha Principe.....*B. albidofusca* (Nyl.) Zahlbr.
5. Apothecia cinnamon fuscous, plane, margin black, 0.4 mm.; ascospores 11–13 × 6–6.5 μ; Kenya.....*B. polioterodes* (Steiner) Zahlbr.

PYRENODESMIA

PYRENODESMIA Mass., Atti I. R. Ist. Veneto II, 3:119. 1853.

Callopisma DNtrs., Giorn. Bot. Ital. II, 2:198. 1847, *non* Martius, 1827 (Gentianaceae).

Caloplaca Th. Fr., Lich. Arctoi, 218. 1860, *pro parte*.

Type: For discussion, see Dodge & Baker, Ann. Mo. Bot. Gard. 25:619. 1938.

Thallus crustose, attached to the substrate by the hyphae of the prothallus or of the medulla, without rhizinae, uniform, mostly yellow and K purple; heteromerous, ecorticate or nearly so; algae protococcoid; medulla of loosely woven, thin-walled hyphae. Apothecia round, appressed or sessile, seldom immersed, lecanorine with a well-developed amphithecium containing cortex, algal layer, and medulla; epithecium granulose to powdery, usually K violet or purple; hypothecium hyaline, lying above the algal layer; paraphyses simple, septate, capitate; asci 8-spored; ascospores hyaline, ellipsoidal to fusiform, polari-bilocular. Spermogonia immersed, with a hyaline wall; spermatiophores closely septate; spermatia short, straight, cylindric. In the following key *C.* is the abbreviation for *Caloplaca*.

1. Apothecia immersed or nearly so.....2
1. Apothecia emersed to sessile and constricted at the base; disc orange, or fulvous.....4
2. Thallus dark olive, subsquamulose; apothecia 0.3–0.5 mm.; ascospores 10–14 × 4–7 μ; Eritrea.....*C. asmarensis* Jatta
2. Thallus white or nearly so, chalky, areolate; disc black; ascospores 14–16 × 7–8.5 μ; Mauretania.....3
3. Thallus margin ciliate, areoles all about the same size and shape.....*C. concinnata* (Hue) Zahlbr.
3. Thallus margin not ciliate, areoles very variable in size and shape.....*C. inconcinna* (Hue) Zahlbr.
4. Thallus fuscescent, disc ferruginous, blackening; ascospores 11–14 × 3.5 μ; Angola.....*C. benguellensis* (Nyl.) Zahlbr.
4. Thallus white to ashy.....5
4. Thallus ferruginous to orange; apothecia and ascospores small.....6
4. Thallus citrine to yellow.....7
5. Thallus granulose, disc ochraceous orange; Abyssinia.....*C. Odoardi* (Bagl.) Zahlbr.
5. Thallus subsquamulose but not effigurate, disc deep orange; ascospores 12–14 × 6 μ; Mauretania.....*P. conglobata* (Hue) Dodge
6. Thallus rimose-areolate; Mozambique.....*C. zambesica* (Müll. Arg.) Zahlbr.
6. Thallus powdery; Abyssinia.....*C. exasperata* (Bagl.) Zahlbr.
7. Thallus areolate, subeffigurate at margin; saxicole; Mozambique [may belong in *Gasparrinia*].....*C. flava* (Müll. Arg.) Zahlbr.
7. Thallus squamulose.....8

8. Squamules 0.2–0.3 mm. on black hypothallus; apothecia 0.2–0.5 mm.; ascospores 12–16 × 6–8 μ; Uganda.....*C. citrinella* (Jatta) Zahlbr.
8. Squamules 0.4–0.7 mm. on pale hypothallus; apothecia 0.4–0.5 mm.; ascospores 15–16 × 6–6.5 μ; S. Sahara.....*C. asekremensis* (Hue) Zahlbr.

PYRENODESMIA **conglobata** Dodge, comb. nov.

Lecanora (Pyrenodesmia) conglobata Hue, Mém. Soc. Bot. France 30:7. 1917.
Caloplaca conglobata Zahlbr., Cat. Lich. Univ. 7:110. 1930.

Type: Mauretania, Boulanouar, on bark of *Acacia tortilis*, Chudeau.

Thallus epiphloeodal, about 1 cm. in diameter, whitish, areolate, areoles quite convex, margin indeterminate, white-arachnoid on bark, but black, about 0.1 mm. wide where growing over the margin of *Ionaspis ascidioides;* cortex 16–20 μ thick, pseudoparenchymatous, heavily nubilated with minute yellowish crystals; algal layer 30–40 μ thick, of closely packed, protococcoid cells 5–6 μ in diameter; medulla scarcely differentiated, but closely septate, much branched hyphae penetrate the cork cells and more or less disorganize them to a depth of 550 μ. Apothecia sessile, somewhat constricted at the base, urceolate when very young, becoming plane, the margin not elevated at maturity, disc burnt sienna, flat, margin flame-scarlet; amphithecium 135 μ thick below the margin of the thecium, thinning to 65 μ at the top, of the same structure as the thallus, algae in large irregular colonies, 40–55 μ in diameter, extending to the top of the thecium when young but soon compressed to a zone below the margin of the thecium when mature by the expanding, hyaline parathecium which is about 15 μ thick below, expanding to 65 μ thick above, the outer 8 μ heavily nubilated with orange granules, of conglutinate, slender, thick-walled hyphae and forming a stipe below reaching the bark, 135 μ in diameter; hypothecium 40 μ thick in the center, thinning to the margin, of closely woven, slender hyphae becoming subvertical just below the thecium; thecium about 100 μ tall; paraphyses slender, conglutinate, repeatedly dichotomous above the asci, tips moniliform, 3 μ in diameter, heavily nubilated with orange crystals to a depth of 15 μ; asci 55 × 15 μ, ellipsoid-clavate, 8-spored; ascospores 12 × 5.5 μ, protoplasts spherical, terminal, 3 μ in diameter, connected by an isthmus, hyaline.

At maturity this species might be mistaken for *Blastenia,* as the algal zone is confined to a ring around the base of the thecium, while all the tissue on the sides of the thecium is parathecial.

Nyasaland: Kasungu Hill, 1100 m., corticole, L. J. Brass 17458a, Vernay Nyasaland Expedition, 1946.

GASPARRINIA

GASPARRINIA Tornabene, Lichenogr. Sicula 27. 1849.

Amphiloma Koerb., Syst. Lich. Germ. 110. 1854.
Aglaopisma DNtrs. in Bagl., Mem. Accad. Sci. Torino II, 17:396. 1856.

Type: *G. murorum* (Hoffm.) Tornabene. (For discussion, see Dodge & Baker, Ann. Mo. Bot. Gard. 25:622. 1938.)

Thallus crustose, effigurate or lobed and subfoliose, mostly yellow, K purple, heteromerous; corticate on both surfaces, cortex pseudoparenchymatous, cells thin-walled; algae protococcoid; medulla arachnoid, of thin-walled hyphae. Apothecia round, appressed or sessile, lecanorine; amphithecium containing cortex, algae, and medulla; epithecium granulose or powdery, usually K purple or violet; hypothecium hyaline, lying above the algal layer; paraphyses simple, septate, capitate; asci 8-spored; ascospores hyaline, ellipsoidal, polari-bilocular. Spermogonia immersed with a thin hyaline wall; spermatiophores closely septate; spermatia short, straight, cylindric. In the following key C. is the abbreviation for *Caloplaca*.

1. Thallus vitelline to pale yellow 2
1. Thallus deep orange to red 3
   2. Thallus thin, very narrow lobed, center verruciform; ascospores 11–18 × 6–8 μ; Uganda ..... *C. murorum* v. *granuliformis* (Vain.) Zahlbr.
   2. Thallus thin, linear lobes with dichotomous tips; apothecia 1 mm.; ascospores 10–13 × 6 μ; on maritime rocks; Angola ..... *C. flavorubens* (Nyl.) Zahlbr.
   2. Thallus vitelline, lobes crisped, margins contiguous; Annobon I. ..... *C. crispicans* (Nyl.) Zahlbr.
3. Apothecia unknown; thallus margins tuberculate, miniate-fulvous 4
3. Apothecia present 5
   4. Areoles convex, small; Socotra ..... *C. granulifera* (Müll. Arg.) Zahlbr.
   4. Areoles plane, larger; Somaliland ..... *C. ochraceofulva* (Müll. Arg.) Zahlbr.
5. Apothecia innate or nearly so, small disc miniate; Abyssinia ..... *Amphiloma debanense* Bagl.
5. Apothecia emersed to sessile 6
   6. Corticole; apothecia small; Abyssinia ..... *C. Beccarii* (Bagl.) Zahlbr.
   6. Saxicole 7
7. Ascospores 7–10 × 2–3 μ; apothecia 0.3–0.5 mm., adnate; Eritrea ..... *C. delicata* Jatta
7. Ascospores 6–8 μ broad 8
8. Ascospores 8–11 × 7–8 μ; apothecia 0.7–0.9 mm.; Angola ..... *C. elegantissima* (Nyl.) Zahlbr.
8. Ascospores 12 × 7 μ; Socotra ..... *C. deplanata* (Müll. Arg.) Zahlbr.
8. Ascospores 12–14 × 6–7 μ; apothecia 0.5–1 mm.; Socotra ..... *C. Balfourii* (Müll. Arg.) Zahlbr.

BUELLIACEAE

Thallus crustose to squamulose, simple or effigurate, without rhizinae, attached to the substrate by hyphae of the hypothallus or of the medulla; cortex variable, evanescent in some species; algae protococcoid; medulla loosely woven, of thin-walled hyphae; sometimes sorediose. Apothecia round, immersed to sessile, lecideine or lecanorine; paraphyses simple or branched above; asci normally 8-spored; ascospores smoke gray becoming brown, 2–4-locular or dwarf-muriform by a longitudinal division of one or more of the middle cells, usually with a thick wall but without a halo as in *Rhizocarpon*. Spermatia short, straight.

Usually the family is divided into two genera; *Buellia* with lecideine apothecia (parathecium highly developed and carbonaceous), and *Rinodina* (parathecium only slightly developed and hyaline, amphithecium well developed). Only *Buellia* is represented in our material.

BUELLIA

BUELLIA DNtrs., Giorn. Bot. Ital. II, 1:1:195. 1846.

Type: Of the three species originally included, we may eliminate *B. canescens* (Dicks.) DNtrs., as it belongs in sect. *Diploicia* which may deserve generic rank. Of the two remaining, Clements & Shear (Gen. Fung. 323. 1931) have chosen *B. parasema* DNtrs.

Thallus crustose, simple, margin sometimes effigurate (sect. *Diploicia*), attached to the substrate by hyphae of the hypothallus or of the medulla, without rhizinae; cortex fastigiate, often evanescent, rarely pseudoparenchymatous; algae protococcoid; medulla of interwoven thin-walled hyphae; occasionally sorediose. Apothecia appressed to sessile (immersed in sect. *Melanaspicilia*), lecideine, black unless the disc is pruinose; amphithecium absent; parathecium entire or dimidiate, carbonaceous; paraphyses capitate, epithecium dark; asci usually 8-spored; ascospores brown to black, ellipsoid, bilocular (in sect. *Eubuellia*) or 4-locular to dwarf-muriform (in sect. *Diplotomma*), with thick walls but without a halo (distinction from *Rhizocarpon* sect. *Catocarpon*).

In sect. *Melanaspicilia*, the apothecia are immersed in the thallus but its well-developed carbonaceus parathecium and small bilocular ascospores clearly relate it to *Buellia* rather than to *Rinodina* where it was placed by Zahlbruckner.

1. Apothecia innate or nearly so; saxicole; MELANASPICILIA 2
1. Apothecia sessile; EUBUELLIA 4
2. Thallus white, rimose-areolate; ascospores 12 × 6 μ; Socotra ..... *B. leucina* Müll. Arg.
2. Thallus yellowish to pale clay color, rimose-aerolate 3
3. Apothecia 0.3–0.4 mm.; ascospores 9–10 × 5.5–6.5 μ; thallus margin inconspicuous; Socotra ..... *B. innata* Müll. Arg.
3 Apothecia 0.3–0.4 mm.; ascospores 10–15 × 6–7 μ; thallus black-margined; Usambara ..... *B. subimmersa* Müll. Arg.
3. Ascospores 10–12 × 6–7 μ; thallus K yellow, black-margined; Angola ..... *B. spuria* v. *ferruginea* Vainio
4. Thallus indistinct, evanescent or not described 5
4. Thallus subcaerulescent; ascospores 10–12 × 5–6 μ; saxicole; Mauretania ..... *B. Chaudeauiana* (Hue) Zahlbr.
4. Thallus rose-color; apothecia 0.8–1 mm.; ascospores 9–12 × 5–6 μ; corticole; Usambara ..... *B. Tobleri* Zahlbr.
4. Thallus olive fuscous; saxicole 8
4. Thallus yellowish to clay color 9
4. Thallus white to ashy or glaucous greenish 11
5. Medulla rose-color; ascospores 14–18 × 6–9 μ; corticole; Angola ..... *B. disciformis* v. *rhodina* Vainio
5. Medulla white 6
6. Disc white-pruinose; thallus K—, C red; saxicole; Abyssinia ..... *B. Caldesiana* v. *subpruinosa* Bagl.
6. Disc not pruinose 7
7. Apothecia 0.3 mm.; ascospores 14–16 × 7.5–8.5 μ; lignicole; Socotra ..... *B. disciformis* v. *oblongata* (Müll. Arg.) Zahlbr.
7. Apothecia 0.7 mm.; ascospores 24–34 × 12–16 μ; ramulicole; Kenya ..... *B. disciformis* v. *pachyspora* Zahlbr.
8. Apothecia 0.16–0.25 mm.; ascospores 10–13 × 7–8 μ; Socotra ..... *B. substigmatea* f. *obfuscata* Müll. Arg.
8. Apothecia 0.4 mm.; ascospores 10 × 5–5.5 μ; Mozambique ..... *B. olivacea* Müll. Arg.
9. Thallus greenish yellow, rimulose, black-margined; ascospores 18.3 × 7–9 μ; Ascension Island ..... *B. pachyospora* Mass.
9. Thallus yellow ashy; disc greenish-pruinose, margin contorted; corticole; Socotra ..... *B. disciformis* v. *contorta* (Müll. Arg.) Zahlbr.
9. Thallus ochraceous to clay-color 10
10. Apothecia 0.25–0.3 mm.; ascospores 8–11 × 4.5–5.5 μ; saxicole; Nyamnyam Territory between Sudan and Congo ..... *B. afra* Vainio
10. Apothecia 0.3–0.6 mm.; ascospores 10–10.5 × 4–4.5 μ; corticole; Mozambique ..... *B. subpulchella* Vainio
11. Thallus gray-green to pale greenish olive 12
11. Thallus white or ashy 14
12. Ascospores 24–27.5 × 10–11.2 μ; thallus ashy green to green, granulose, prothallus ashy black; apothecia 0.3–1 mm., disc bluish-pruinose; corticole; Usambara ..... *B. crassa* Riehmer
12. Ascospores smaller, 11–15 × 5–7.5 μ 13

13. Thallus subsquamulose, greenish gray; apothecia 0.5–0.75 mm.; terricole; Ruanda.....*B. argilliseda* Zahlbr.
13. Thallus rimulose-areolate, pale grayish olive; apothecia 0.5 mm. or aggregated in compact groups up to 2 mm. in diameter; corticole; Sierra Leone.....*B. Adamesii* Dodge
13. Thallus rimulose-areolate, olive green; apothecia 0.16–0.25 mm.; Socotra.....*B. substigmatea* Müll. Arg.
14. Medulla cinnabar red; thallus of tumid, bullate areoles, chalky white; disc very convex, ashy-pruinose; saxicole; Abyssinia.....*B. toninioides* Bagl.
14. Medulla white 15
15. Lignicole; thallus poorly developed; apothecia 0.3 mm.; ascospores 14–16 × 5–8 μ; Socotra .....*B. disciformis* v. *oblongata* (Müll. Arg.) Zahlbr.
15. Corticole 16
15. Saxicole 20
16. Asci 12-spored; ascospores 15.5–17 × 5–6.5 μ, each locule often biguttulate, then appearing falsely 4-locular; thallus black-margined; apothecia 0.3–0.4 mm.; Mozambique .....*B. subdives* v. *mozambica* Vainio
16. Asci 8-spored 17
17. Ascospores 20–25 × 7–9 μ; Mozambique.....*B. americana* v. *palmensis* (Vainio) Zahlbr.
17. Ascospores much smaller 18
18. Apothecial margin ashy, disc black; ascospores 13 × 7 μ; thallus subrimulose, very thin, ashy; Kenya .....*B. cinereocincta* Müll. Arg.
18. Apothecia wholly black 19
19. Ascospores 9–12 × 4–5 μ; thallus rimose, areoles convex, white, K orange, C red; St. Helena .....*B. approximans* (Leight.) Zahlbr.
19. Ascospores 12–15 × 5–5.5 μ; thallus areolate, whitish; Sierra Leone.....*B. Deightoni* Dodge
20. Hypothallus black, areoles white, angular, scattered or partly contiguous; apothecial margin white, crenulate at first; parathecium dimidiate; ascospores 9 × 5 μ; Socotra .....*B. albinea* Müll. Arg.
20. Hypothallus black, radiating far beyond the assimilative thallus; apothecia 0.3 mm.; ascospores 7–9 × 4–5 μ; Kenya.....*B. prosperens* Müll. Arg.
20. Hypothallus inconspicuous or forming a very narrow black margin.....21
21. Ascospores 8–9 × 4–5 μ 22
21. Ascospores 8–13 × 4–6 μ; thallus areolate, white, K yellow; apothecia small; Abyssinia .....*B. italica* v. *debanensis* Bagl.
21. Ascospores 11–16 × 5–7 μ 23
21. Ascospores 14–16 × 7.5–8.5 μ; thallus rugose-areolate, white; disc greenish-pruinose; Socotra.....*B. parasema* v. *subaeruginosa* Müll. Arg.
21. Ascospores 15–17 × 7–8 μ; thallus ashy, verrucose-areolate, K yellow; Abyssinia.....*B. dispersa* v. *cinerascens* Bagl.
22. Apothecia 0.1–0.2 mm.; thallus white, K slightly yellowish, with a narrow black margin; Angola .....*B. stellulata* f. *subtilis* Vainio
22. Apothecia 0.2–0.3 mm.; thallus ashy; Eritrea.....*B. paupercula* Jatta
23. Apothecia 0.5 mm.; thallus white, rimulose with a narrow black margin; Ilha Principe .....*B. delaevata* (Nyl.) Zahlbr.
23. Apothecia 0.4–0.8 mm.; thallus chalky white, rimose-areolate, without a conspicuous margin; Angola .....*B. subalbula* (Nyl.) Müll. Arg.

Buellia **Adamesii** Dodge, sp. nov.

Type: Sierra Leone, Sefadu (Gbense), on trunk of *Elaeis guineensis*, P. Adames, comm. F. C. Deighton M4755.

Thallus epiphloeodes, rimoso-areolatus, ca. 130 μ crassitudine, pallide griseo-olivaceus; cortex non bene evolutus; stratum algarum 25 μ crassitudine, filamentis cylindricis dense dispositis *Trentepohliae?*, 4–5 μ diametro, cellulis cylindricis aut apicibus rotundatis inter hyphas verticales, 2 μ diametro; medulla ca. 105 μ crassitudine, hyphis verticalibus tenuibus, plus minusve granulis inspersis, magis periclinalibus et compactis in strato inferno 15–20 μ crassitudine. Apothecia orbicularia, sessilia, basi constricta, solitaria 0.5 mm. diametro aut aggregata in gregibus ad 2 mm. diametro, nigra; parathecium inferne 80–95 μ crassitudine ad

10 μ superne tenuescens, pseudoparenchymaticum, cellulis leptodermeis, radiantibus, 6–7 μ diametro, brunneum; hypothecium 25 μ crassitudine, brunneum; thecium 105–120 μ altitudine; paraphyses tenues, subdichotome ramosae, cellulis terminalibus subsphericis nigro-brunneis; asci subcylindrici, 55 $\times$ 14 μ; ascosporae octonae, imbricatim monostichae, biloculares, brunneae, 14–15 $\times$ 5–6 μ.

Thallus epiphloeodal, rimose-areolate, about 130 μ thick, light grayish olive; cortex not differentiated; algal layer 25 μ thick, of closely packed, vertical filaments of *Trentepohlia?* 4–5 μ in diameter, cells cylindric or with rounded ends, between vertical hyphae 2 μ in diameter; medulla about 105 μ thick, of slender, mostly vertical, loosely woven hyphae, more or less inspersed with granules, becoming compact and periclinal in the lower 15–20 μ. Apothecia round, 0.5 mm. in diameter when solitary, often aggregated into groups up to 2 mm. in diameter, black, constricted at the base; parathecium 80–95 μ thick below the hypothecium, thinning to 10 μ at the top of the thecium, of radiating, thin-walled pseudoparenchyma, cells 6–7 μ in diameter, brown, the outer 15 μ very dark brown; hypothecium about 25 μ thick, dark brown; thecium 105–120 μ tall; paraphyses slender, not dense, somewhat dichotomous, terminal cells dark brown, subspherical, 3 μ in diameter; asci 8-spored, subcylindric, 55 $\times$ 14 μ; ascospores imbricately monostichous, bilocular, deep brown, not or slightly constricted at the septum, 14–15 $\times$ 5–6 μ.

The systematic position of this species is somewhat uncertain. The algae seem to be filaments of *Trentepohlia*, unless they are protococcoid and so distorted by mutual pressure as to appear filamentous, a condition occasionally seen in some species of the Verrucariaceae. If the filaments are *Trentepohlia*, the lichen may be related to *Catinaria* Vainio, which has hyaline ascospores. The often-elongate and variously curved (sometimes lirelliform) apothecia of the crowded aggregates closely resemble those of *Enccphalographa* (with *Palmella* algae) and are formed in the same way as those of *E. cerebrinella* (Nyl.) Zahlbr. from Kerguelen. The loosely arranged paraphyses are also very unusual in *Buellia*.

The first apothecium is round and solitary, about 0.5 mm. in diameter. After the ascospores are shed, the thecium disintegrates. From several points near the margin, or more irregularly scattered over the disc, new apothecia proliferate until the parathecia touch but do not fuse, and by mutual pressure assume very irregular shapes until the aggregate, seen from above, somewhat resembles a member of the Chiodectonaceae such as *Sarcographa*. In some of the larger groups (not sectioned) there is a suggestion of a third proliferation.

There is also a possibility that the species might be referred to *Rinodina*, as I have seen an occasional algal cell in the outer portion of the tissue which I have called the parathecium, clearly apothecial in origin, not thalline. The ascospores more closely resemble those of *Buellia*.

Buellia **Deightoni** Dodge, sp. nov.

Type: Sierra Leone, Njala (Kori), on *Amphimas pterocarpoides*, F. C. Deighton M4334B.

Thallus epiphloeodes, albidus, subverrucosus, margine indistincto, usque ad 55–65 μ crassitudine; cortex decompositus, gelifactus, 8–16 μ crassitudine, superne granulis inspersus; stratum algarum 27–40 μ crassitudine, cellulis *Trebouxiae* 5–6 μ diametro; medulla hyphis 2 μ diametro. Apothecia 0.3–0.4 mm. diametro, nigra, margine integro, tenui, subelevato, disco convexo, nigro, nudo; parathecium dimidiatum, 16 μ crassitudine, hyphis pachydermeis nigro-brunneis; hypothecium centro 55 μ crassitudine ad marginem tenuescens, hyphis brunneis, 4 μ diametro; thecium 55–65 μ altitudine; paraphyses tenues, super ascos dichotome ramosae, apicibus capitatis, cellulis apicalibus sphaericis, obscure brunneis, cellulis penultimis pyriformibus, pallide brunneis; asci cylindrico-clavati, 30 $\times$ 12 μ; ascosporae octonae, brunneae, biloculares, anguste ellipsoideae subcylindricaeve, ad septum non constrictae, 12–15 $\times$ 5–5.5 μ.

Thallus epiphloeodal, margin indeterminate, slightly verrucose, up to 55–65 μ thick above the outermost bark cells, whitish; cortex decomposed, gelified, 8–16 μ thick, outer portion with minute granules; algal layer 27–40 μ thick, of colonies of *Trebouxia*, cells 5–6 μ in diameter, separated by strands of vertical hyphae 6–8 μ wide; medulla of hyphae about 2 μ in diameter, blackening and disorganizing the outermost bark cells, then forming a hyaline layer about 55 μ thick, of loosely interwoven strands of hyphae between fragments of disintegrating hyaline bark cells, with an occasional whole cell or small group of bark cells, some strands of hyphae penetrating between the brown bark cells to a distance of 120 μ. Apothecia 0.3–0.4 mm. in diameter, black, margin thin, entire, slightly elevated, disc nude, black, becoming very convex; parathecium dimidiate, 16 μ thick, of dark brown, thick-walled hyphae, carbonaceous in thick sections; hypothecium about 55 μ thick in the center, thinning to the margin, of dark brown hyphae 4 μ in diameter; thecium 55–65 μ tall; paraphyses slender, not crowded in the thecial gel, dichotomous above the asci, tips capitate, terminal cells spherical, dark brown, penultimate cells pyriform, pale brown; asci cylindric-clavate, 8-spored, 30 $\times$ 12 μ; ascospores brown, bilocular, narrowly ellipsoid to subcylindric, not constricted at the septum, 12–15 $\times$ 5–5.5 μ.

Dimensions are quite variable in different portions of the same thallus and apothecium. I have given maximum dimensions, the minimum being about half those given. After the thecium disintegrates, the base remains white-powdery, so that parts of the thallus appear soraliate. It is not clear whether the thallus consists of small areoles, discrete and rounded on an inconspicuous hypothallus, bearing 1–3 apothecia each, or whether the thallus was originally continuous over a large area and the intervening tissue has weathered away.

Physciaceae

Thallus foliose, deeply lobed, appressed to the substrate or with ends of lobes erect (rarely completely erect in some species of *Anaptychia*); rhizinae usually present; corticate above and below (except in some species of *Anaptychia*); algae protococcoid. Apothecia circular, sessile, lecideine, pseudolecideine or lecanorine; paraphyses simple; asci 8-spored; ascospores brown, septate, usually 2-locular, rarely 4-locular or dwarf-muriform, with thick walls. Spermatiophores septate; spermatia short, straight.

PYXINE

Pyxine Fries, Syst. Orb. Veg. 267. 1825.

Phragmopyxine Clements, Gen. Fung. 84. 1909.

Type: *Lecidea sorediata* Ach. *Phragmopyxine* was based on *P. Eschweileri* Tuck.

Thallus foliose, deeply lobed, attached to the substrate by rhizinae; upper cortex pseudoparenchymatous from conglutinate vertical hyphae; algae protococcoid; medulla thick, of mostly periclinal hyphae; lower cortex often not sharply differentiated, of periclinal hyphae; soredia common. Apothecia lecideine, at least black and more or less carbonaceous at maturity; epithecium K violet; hypothecium dark; paraphyses simple, conglutinate; asci 8-spored; ascospores brown, 2(–4)-locular, thick-walled. Spermogonia immersed, mouth dark; spermatiophores septate; spermatia lateral, short-cylindric, straight.

1. Thallus isidiose, reticulately wrinkled, K yellow, medulla K yellow fulvescent, C—; corticole; Usambara ..... *P. retirugella* f. *isidiigera* Müll. Arg.
1. Thallus sorediose 2
1. Thallus without isidia or soredia 5
   2. Medulla yellow to orange or tawny 3
   2. Medulla white 4
3. Medulla and marginal soredia light yellow; saxicole; Abyssinia ..... *P. Meissneri* v. *sorediosa* Müll. Arg.
3. Medulla and small superficial soredia orange; corticole; Kenya ..... *P. Cocoes* v. *chrysantha* Müll. Arg.
3. Medulla tawny, small soredia white to tawny; lobes 0.5(–1) mm. wide; apothecia 0.7 mm.; ascospores 14–20 × 5–7 μ, 2(–4)-locular; corticole; Angola ..... *P. chrysantha* Vainio
   4. Lobes 3–6 mm. wide, ashy-glaucescent, soralia 0.5–1.5 mm., soredia greenish white; apothecia 0.5–0.8 mm.; ascospores 16–22 × 6–8 μ; corticole; Kenya ..... *P. dimorpha* Hue
   4. Lobes 2–3.5 mm. wide, pale yellowish, soralia spherical, 2–2.5 mm. in diameter, white; apothecia 0.7–1 mm.; ascospores 15–19 × 7–8 μ; corticole; French West Tropical Africa ..... *P. Chevalieri* Hue
   4. Lobes narrower, soredia superficial, white; apothecia not described; corticole; Usambara ..... *P. Cocoes* f. *sorediigera* Müll. Arg.
5. Thallus yellow to yellowish gray 6
5. Thallus white 7
   6. Thallus sulfur color, habit of *P. Cocoes;* medulla C orange-red; sterile; corticole; Mozambique ..... *P. sulphurans* Nyl.
   6. Thallus yellowish gray, under-side black, without rhizinae; apothecia 0.3 mm.; ascospores 12–14(–20) × 6–7.5 μ; saxicole; Annobon I. ..... *P. devertens* (Nyl.) Vainio
   6. Thallus olive buff, under-side black, without rhizinae, medulla white; sterile; Sierra Leone ..... *P. Adamesii* Dodge
7. Ascospores 17–21 μ long; thallus with habit of *P. Meissneri,* medulla K—; corticole; Abyssinia ..... *P. endoleuca* (Müll. Arg.) Vainio
7. Ascospores smaller 8

8. Lobes plane, much wider than typical *P. Cocoes;* corticole; Congo....*P. Cocoes* v. *congensis* Stein
8. Lobes convex 9
9. Epithecium greenish, lobes very convex; corticole; Usambara.....*P. Cocoes* v. *convexior* Müll. Arg.
9. Epithecium fuscous, disc convex, chalky pruinose; lobes slightly convex but never plane or concave; corticole; Socotra.....*P. convexa* Müll. Arg.

Pyxine **Adamesii** Dodge, sp. nov.

Type: Sierra Leone, Sefadu (Gbense), on trunk of *Elaeis guineensis*, P. Adames, comm. F. C. Deighton M4756a.

Thallus foliosus, olivaceo-alutaceus, centro subcrustosus, laciniae subimbricatae, lobis marginalibus subflabellatis, dichotome ramosis, apicibus ad 0.5 mm. latitudine, rotundatis, subpruinosis, 100 μ crassitudine, K—, C—; soralia elevata, rotundata, ad 0.7 mm. diametro, sorediis flavido-viridibus, granularibus, K—, C—; cortex 16 μ crassitudine, pseudoparenchymaticus, hyphis verticalibus, 3 μ diametro, cellula supera granulis inspersa; stratum algarum 15 μ crassitudine, cellulis protococcoideis; medulla alba, K—, C—, ca. 50 μ crassitudine, hyphis periclinalibus, 4–5 μ diametro, dense contexta; cortex inferior 8 μ crassitudine, hyphis nigro-brunneis periclinalibus. Sterilis.

Thallus foliose, olive buff, subcrustose in the center, laciniae subimbricate, marginal lobes subflabellate, dichotomous, apices 0.5 mm. or less wide, rounded, slightly white-pruinose, 100 μ thick, K—, C—; soralia elevated, 0.7 mm. in diameter, soredia yellowish green, granular to subisidioid, K—, C—; upper cortex 16 μ thick, pseudoparenchymatous, of vertical hyphae 3 μ in diameter, upper cell inspersed with minute granules; algal layer 16 μ thick, cells protococcoid; medulla white, K—, C—, about 50 μ thick, of densely woven periclinal hyphae 4–5 μ in diameter; lower cortex about 8 μ thick, of very dark brown periclinal hyphae. Sterile.

The thallus had been overgrown by *Parmelia lobulascens* v. *isidiosissima* and most of the algal cells had disintegrated, leaving lacunae in what is obviously the algal layer.

PHYSCIA

Physcia Vainio, Etude Lich. Brésil 1:138. 1890.

Type: The early history and synonymy of this genus are very involved, and I will postpone their consideration to a later time.

Thallus foliose, attached to the substrate by rhizinae, prostrate or outer portions of lobes erect, laciniae narrow, branched, margins sometimes ciliate; upper cortex pseudoparenchymatous from conglutinate vertical hyphae; algae protococcoid; medulla rather loosely woven of mostly periclinal hyphae; lower cortex of conglutinate, periclinal hyphae. Apothecia lecanorine, amphithecium well developed; parathecium scarcely differentiated (unless the thick black disc under the hypothecium represents a modified parathecium in sect. *Dirinaria*), disc deep reddish brown to fuscous and black, epithecium K—; paraphyses simple, usually septate; asci 8-spored; ascospores 2(–4)-locular or dwarf-muriform, brown. Spermogonia immersed or nearly so; spermatiophores septate; spermatia lateral, long cylindric or somewhat curved in a few species.

1. Hyaline below the hypothecium; EUPHYSCIA 2
1. Dark brown to black layer below the hypothecium; DIRINARIA 8
2. Thallus at least partly pruinose, soraliate; apothecia unknown....3
2. Thallus not sorediose; apothecia present 4
3. Thallus pale ashy, white-reticulate, K yellow above, medulla K—; soralia elevated; Angola ....*P. reticulata* Vainio
3. Thallus chalky white, fuscescent, K—, medulla K—; soralia 0.5–1 mm. in diameter; Kenya ....*P. Poncinsii* Hue
4. Thallus margins setose, apices of laciniae yellow; Usambara....*P. setosa* f. *vitellina* Müll. Arg.
4. Thallus subcrustose in center, radially wrinkled, marginal lobes not ciliate; apothecial margin crenulate, disc dark fuscous; saxicole; Guinea....*Parmelia incisa* Fr.
4. Thallus not as above 5
5. Ascospores 25–30 × 12–14 μ; apothecia 2–3 mm., margin entire, disc dark fuscous, pruinose; thallus white, smooth or partly wrinkled, pale below; Abyssinia....*Physcia dilatata* Nyl.
5. Ascospores 21–24 × 8–9.5 μ; apothecia 1.5 mm., margin vertically sulcate, disc rufous then black, not pruinose; thallus white to olive buff; Kenya....*P. Poncinsii* Hue *sensu* Dodge
5. Ascospores not over 22 μ, mostly shorter 6
6. Ascospores 16–18 × 9–11 μ; apothecia 0.4–0.7 mm., margin slightly crenulate, disc dark fuscous; thallus olive, subcrustose in center, laciniae short, smooth; Usambara ....*P. abbreviata* Müll. Arg.
6. Ascospores 12–15 × 7–8 μ; apothecia very small; saxicole; Socotra....7
6. Ascospores (15–)18–20(–22) μ; apothecia 1 mm., margin entire, disc dark rufous, pruinose; thallus white, not pruinose, smooth; Kenya....*P. afra* Hue
7. Thallus dark olive green....*P. obscurella* Müll. Arg.
7. Thallus olive fuscous....*P. obscurella* v. *fusca* Müll. Arg.
8. Thallus isidiose, K yellow, medulla white, K—; ascospores (13–)16.5 × 6–6.5 μ; Ivory Coast ....*P. isidiophora* des Abb.
8. Thallus not isidiose 9
9. Medulla some shade of deep red; sterile, and reference here doubtful as colored medullae occur in *Euphyscia* and *Pyxine* 10
9. Medulla white 11
10. Medulla purple-red; Kenya....*P. picta* v. *coccinea* Müll. Arg.
10. Medulla blood-red; thallus pale gray, white-pruinose; Kenya....*Crocynia haematina* Stein
10. Medulla red; Congo ....*Crocynia Leopoldi* Stein
11. Thallus yellow; sterile, and reference here doubtful....12
11. Thallus white or grayish 13
12. Laciniae convex, narrow, soralia circular, soredia isidioid; Ascension Island.... ....*P. flava* Müll. Arg.
12. Laciniae broader, similar to sorediose varieties of *P. picta* but intense yellow, sparingly sorediose above; Kenya....*P. picta* v. *flavicans* Müll. Arg.
13. Thallus ashy 14
13. Thallus pure white 16
14. Ascospores 12–15 × 5–7 μ; thallus ashy to lead-color, fuscescent; Angola.... ....*P. africana* Müll. Arg.
14. Ascospores 13–18 × 5–8 μ; thallus ashy-glaucous....15
14. Ascospores 15–23 × 7–9 μ; disc ashy-pruinose, dark disc under the hypothecium much thicker than the thecium, extending part way up the sides of the thecium; thallus similar to *P. stellaris* v. *acrita*; corticole; Socotra....*P. endopyxinea* Müll. Arg.
15. Thallus K yellow; Ilha Principe....*P. palmarum* Vainio
15. Thallus K—; Angola ....*P. areolata* Vainio
16. Ascospores 9–12 × 5–6 μ; thallus subcrustose in center [probably *Lecanora adscensionis* Ach. is a synonym]; saxicole....*P. ascensionis* Müll. Arg.
16. Ascospores 15–20 × 6–8 μ; lobes 1–3 mm. wide; corticole; Kenya....*P. singularis* Hue
16. Ascospores 18–22 × 6–8 μ; lobes crenulate, pulverulent; saxicole; Guinea.... ....*P. aegiliata* (Ach.) Nyl.
16. Ascospores 15–23 × 7–9 μ; dark disc under the thecium much thinner than the thecium; lobes with pulvinate soredia, K— yellow; saxicole; Abyssinia.... ....*Hagenia picta* v. *rupicola* Bagl.

PHYSCIA PONCINSII Hue, Mém. Soc. Bot. France 28:10. 1916.

Type: Kenya, Tika River, southeast of Mt. Kenya at Blue Post, 45 km. from Nairobi on road to Fort Hall, 1500 m., Poncins.

Thallus foliose, not closely adnate, more or less circular, up to 2.5 cm. in diameter, laciniae 1–2.5 mm. wide, radiating, white to olive buff, margins and surface of lobes soraliate, soralia up to 1 mm. in diameter, convex, and coarsely granular; upper cortex 20–40 μ thick, pseudoparenchymatous from vertical thin-walled hyphae, cells mostly 6–8 μ in diameter, upper portion heavily nubilated with grayish granules; algal layer 20–40 μ thick, of protococcoid cells 5–8 μ in diameter, continuous and closely packed; medulla 100–200 μ thick, of loosely woven, periclinal hyphae 3–4 μ in diameter, heavily nubilated with minute brownish granules; lower cortex 20–40 μ thick, of conglutinate thick-walled hyaline hyphae, the outer 6–8 μ nubilated with dark brown granules; rhizinae 60–75 μ in diameter, long, white, finally darkening. Apothecia elevated, cupulate, constricted at the base to substipitate, about 1.5 mm. in diameter, margin smooth, then vertically sulcate, inrolled, becoming completely isidio-sorediose, disc rufous at first, becoming black, not pruinose; amphithecium of young apothecia 185 μ thick, of the same structure as the thallus but the algal layer 100 μ thick on the sides of the thecium, only 60 μ thick below with cortex thickened to 60 μ; parathecium not clearly differentiated; hypothecium 15 μ thick, of dense subvertical hyphae; thecium 105 μ tall; paraphyses conglutinate, dichotomous above, tips capitate, terminal cell brownish, subspherical, 3–4 μ in diameter, nubilated with brown crystals; asci clavate, thick-walled when young, 8-spored, 65 $\times$ 16 μ; ascospores bilocular, constricted at the septum, brown, imbricately monostichous, 21–24 $\times$ 8–9.5 μ. Spermogonia flask-shaped, immersed in the medulla and the lower half of the algal layer, wall hyaline, scarcely differentiated, venter about 50 μ in diameter and 40 μ tall, neck 20 μ in diameter and 55 μ tall; spermatiophores erect, septate; spermatia bacilliform, straight, about 4–5 $\times$ 1 μ.

I hesitated to refer my material to this species, as the thallus is not pruinose, the medullary hyphae are heavily nubilated, and the dimensions of the mature thallus are twice those given by Hue. The thalli are very fragile and have been removed from the substrate. The structure of the thallus and of the soralia agrees with that given by Hue. The apothecia in the Cameroons material are immature, as only young asci are found and soralia are just beginning to form on the margins, while the Nigerian material is quite mature, ascospores varying from brown to almost black. The dimensions of the microscopic characters are identical.

Cameroons: near Kumba, on *Theobroma*, C. A. Thorold 137.

Nigeria: Majeriko near Ibadan, on *Theobroma*, C. A. Thorold 138.

Physcia abbreviata Müll. Arg., Bot. Jahrb. [Engler] 20:260. 1894.

Type: Usambara, corticole, Holst 1016 *p.p.*

Thallus foliose, small, closely appressed, smooth, 120 μ thick, margin very irregularly lobed, lobes rounded, 0.5–1 mm. wide, center subcrustose, deep olive; upper cortex 20–25 μ thick, hyaline, pseudoparenchymatous; algal layer 55 μ thick, of closely packed protococcoid cells 5–6 μ in diameter; medulla 25–40 μ thick, of compactly woven subvertical hyphae, with occasional algal cells nearly to the lower cortex; lower cortex 20–25 μ thick, of coarse, conglutinate hyphae, the outer ones brownish; rhizinae short, about 15 μ in diameter, once dichotomous

near the tip. Apothecia 0.4–0.7 mm. in diameter, sessile, not constricted at the base, margin entire to subcrenulate, concolorous with the thallus, disc opaque, fuscous black; amphithecium 55 μ thick, of the same structure as the thallus; hypothecium 15 μ thick, of deeply staining, subvertical hyphae; thecium 105 μ tall; paraphyses slender, walls gelified, dichotomous above the asci, the upper 3 cells spherical, brown, 3 μ in diameter; asci 50 $\times$ 12 μ, thick-walled and tip of the protoplast thickened when young, 8-spored, clavate; ascospores brown, bilocular, not constricted at the septum, protoplasts ellipsoid, connected by an isthmus when immature, 16–18 $\times$ 9–11 μ.

Only a single thallus about 5 $\times$ 10 mm., with four apothecia, was available for study, on a twig associated with *Ionaspis ascidioides*, *Pyrenodesmia conglobata*, and *Physcia afra* Hue. The apothecium sectioned is rather immature; the ascospores still very pale brown, 13–14 $\times$ 6–8 μ.

Nyasaland: Kasungu Hill, 1100 m., on living bark, L. J. Brass 17458a.

PHYSCIA AFRA Hue, Mém. Soc. Bot. France 28:11. 1916.

Type: Kenya, Tika River southeast of Mt. Kenya at Blue Post, 45 km. from Nairobi, on road to Fort Hall, 1500 m., corticole, Poncins.

Thallus white-opaque but not pruinose, K—, rounded, 15 mm. in diameter, laciniae 1–1.5 mm. wide near the center, narrowing to 0.3–0.6 mm. near the 2–3-fid tips, slightly convex, white below with white rhizinae; upper cortex 30–40 μ thick, pseudoparenchymatous, of vertical hyphae 8–10 μ in diameter; algal layer 40 μ thick, cells protococcoid, 6–10 μ in diameter; medulla 50–80 μ thick, of compactly woven, very thick-walled hyphae 4 μ in diameter; lower cortex 20 μ thick, of hyaline, periclinal hyphae; rhizinae short, 60 μ in diameter. Apothecia 1 mm. in diameter, constricted at the base, margin thick, prominent, entire, disc dark rufous to black, pruinose; amphithecial cortex 30 μ thick above, 40–90 μ thick below; parathecium hyaline, 12–15 μ thick above to 40 μ thick below the thecium, of periclinal hyphae above, intricate and forming the hypothecium below; paraphyses dichotomously or corymbosely branched above, tips capitate, dark rufous, 2–3 μ in diameter; ascospores brown, bilocular, distichous, (15–)18–20 (–22) μ.

I have had a single thallus with only one apothecium which was not sectioned. The macroscopic and the microscopic characters of the thallus agree with the above description which was translated from the original.

Nyasaland: Kasungu Hill, 1100 m., on living bark, L. J. Brass 17458a, Vernay Nyasaland Expedition.

ANAPTYCHIA

ANAPTYCHIA Koerb. in Mass., Mem. Lichenogr. 33. 1853.

Borrera Ach. Lichenogr. Univ. 93, 496. 1810, *p.p. min.*
Heterodermia Trev., Atti Soc. Ital. Sci. Nat. Milano 11:613. 1868.
Pseudophyscia Müll. Arg., Bull. Herb. Boissier 2:append. 1:10. 1894.

Type: not designated; *A. ciliaris* and *A. leucomelaena* treated, either of which

would conserve the genus in its present usage. *Borrera* was based on fifteen species, three now included in *Anaptychia*, the rest now in the Usneaceae, Parmeliaceae and Teloschistaceae, and the name has been abandoned. *Heterodermia* Trev. was based on seven species, all now included in *Anaptychia*. *Pseudophyscia* Müll. Arg. was based on *Lichen speciosus* Wulf.

Thallus foliose to fruticose, but always dorsi-ventral, prostrate to more or less erect, laciniae relatively narrow, branched, margins often ciliate; upper cortex of conglutinate periclinal hyphae; algae protococcoid; medulla rather loosely woven of mostly periclinal hyphae; lower cortex of conglutinate periclinal hyphae, often absent except at the margins of the lobes. Apothecia lecanorine, covered by the amphithecium until nearly mature, margin usually lacerate or lobulate; amphithecium well developed; parathecium scarcely differentiated, disc fuscous, often pruinose, epithecium K—; paraphyses simple, usually septate; asci 8-spored; ascospores bilocular, brown. Spermogonia immersed or nearly so; spermatiophores septate; spermatia lateral, short-cylindric, straight.

Most species have unusually wide geographic ranges and no species have been described based on tropical African material.

ANAPTYCHIA **Adamesii** Dodge, sp. nov.

Type: Sierra Leone, Sefadu (Gbense), on trunk of *Elaeis guineensis*, P. Adames, comm. F. C. Deighton M4752, growing over moribund *Parmelia (Amphigymnia) lobulascens* Stnr. v. *isidiosissima* Dodge.

Thallus foliosus, dichotome vel subtrichotome ramosus, laciniae ca. 1 mm. latitudine, soraliis capitatis terminalibus, 150 μ crassitudine, olivaceo-alutaceus, inferne ecorticatus, superficie arachnoidea, flava; rhizinae nigrae, nitentes, 2 mm. longitudine, dense squarroso-ramosae, marginales; cortex superior 55–65 μ crassitudine, gelifactus, hyphis periclinalibus dense contextus, strato extero 15 μ crassitudine, crystallis minutis, flavo-brunneis nubilato; stratum algarum 15–25 μ crassitudine, cellulis *Trebouxiae*, plus minusve angulosis pressione mutua, 6–7 μ diametro; medulla 60–80 μ crassitudine, hyphis pachydermeis, granulis griseis nubilatis, laxius intertextis et brunneis in strato infero, 15 μ crassitudine. Apothecia immatura, stipitata, cupularia, margine inflexo dentato; cortex amphithecialis inferne 250 μ crassitudine ad 35 μ in margine inflexo tenuescens, gelifactus, hyphis superficie perpendicularibus, in dimidia parte extera granulis brunneis nubilatis, intus griseis; stratum algarum 105 μ crassitudine circa thecium, ad 80 μ in margine tenuescens; medulla 40 μ crassitudine circum thecium; superficies thalli sub apothecio corticatus, cortex 135 μ crassitudine, structurae corticis amphithecialis similis; hypothecium 80 μ crassitudine, hyphis tenuibus subbrunneis, dense contextum; thecium ca. 110 μ altitudine; paraphyses tenues, dichotome ramosae, apicibus clavatis, 3 μ diametro; asci immaturi clavati, pachydermei, 95 $\times$ 20 μ; ascosporae non visae.

Thallus foliose, dichotomously and subtrichotomously branched, laciniae about 1 mm. broad, mostly terminating in large capitate soralia 150 μ thick, olive buff, ecorticate below, surface arachnoid, yellow becoming tawny in the older portions; rhizinae black, shining, about 2 mm. long, densely squarrose-branched, marginal,

close set, giving the appearance of laciniae on a black hypothallus; upper cortex 55–65 μ thick, highly gelified, of interwoven, mostly periclinal hyphae, the outer 15 μ nubilated with minute yellowish brown crystals; algal layer 15–25 μ thick, more or less continuous, of closely packed colonies of *Trebouxia*, cells more or less angular from mutual pressure, 6–7 μ in diameter; medulla 60–80 μ thick, of interwoven, very thick-walled hyphae about 5 μ in diameter, nubilated with grayish granules, brownish in the lower 15 μ, more loosely woven below. Apothecia immature, cupulate, stipitate, margin inflexed, dentate; amphithecial cortex 250 μ thick below, thinning to 35 μ thick over the thecium, highly gelified, hyphae perpendicular to the surface, forming a pseudoparenchyma, heavily nubilated with granules, brownish in the outer half, grayish within; algal layer 105 μ thick around the thecium, thinning to 80 μ thick above it, outer surface of the layer dentate; medulla about 40 μ thick around the thecium, not extending above it; under-side of the thallus corticate below the thecium, cortex 135 μ thick, similar in structure to that of the amphithecium; hypothecium about 80 μ thick, of densely woven, slender, slightly brownish hyphae; thecium about 110 μ tall; paraphyses slender, dichotomous, tips capitate-clavate, 3 μ in diameter; immature asci clavate, about 95 $\times$ 20 μ, thick-walled; ascospores not seen.

Fungi

Mytilidium sp.—A few hysterothecia, shaped like a clam-shell, were found on twigs of *Bauhinia tomentosa* from Njala (Kori), Sierra Leone, F. C. Deighton 4307, which do not seem referable to a previously described species, but the material is so scanty that I hesitate to describe it as new. The ascospores are brown, fusiform, 4-locular, slightly curved, about 32 $\times$ 10 μ, uniseriate in the ascus. The hysterothecia are erumpent through a lichen thallus covering the bark, but I have found no connection between the fungus and the lichen thallus. Were such a connection evident it might be referred to *Sclerographis*, from which it differs greatly in habit. The paraphyses are slender, somewhat dichotomous above the asci, but not branched and anastomosing to form an epithecium as in the Opegraphaceae, to which *Sclerographis* belongs.